MODERN
Machine Shop
November, 1932

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for THE BIG JOB
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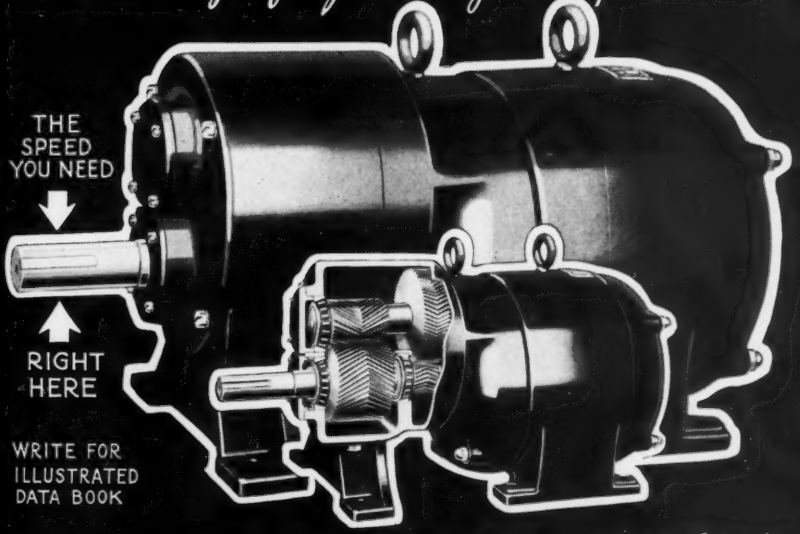

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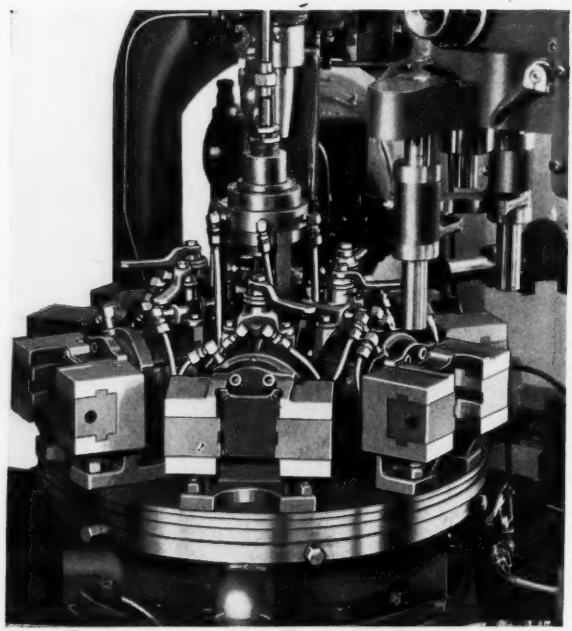
THE MASTER ELECTRIC COMPANY
DAYTON OHIO U. S. A.



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LOGANSPORT, INDIANA

Designers and Manufacturers of Air and Hydraulic-Operated Devices for Every Work-Holding Requirement and Many Other Purposes.

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DIAMOND BORING MACHINE

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MODERN Machine Shop

HOWARD CAMPBELL, Editor

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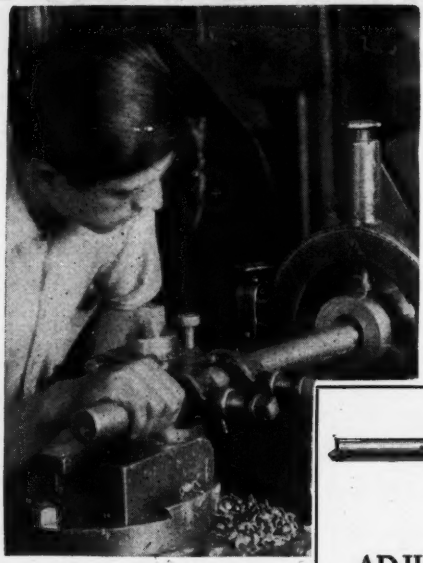

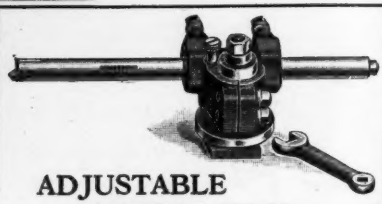

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MODERN Machine Shop

CINCINNATI, OHIO NOVEMBER, 1932 VOL. 5, NO. 6

C & O Shops at Huntington Are Well Equipped

(Concluded)

Grinding-in double exhaust stand connections---Testing devices --- Air-operated fixtures --- Jig for assembling duplex piston rings

By HOWARD CAMPBELL

JOINTS of double exhaust stands are ground-in to a perfect fit by the use of the equipment shown in Fig. 10. An eccentric crank is fitted to the spindle of an air motor, which is anchored in a vertical position by being attached to a vertical bar that is bolted to the front end of the engine, as shown. A bar forms a connection between the crank and the exhaust stand so that, when the motor is in operation, the stand is reciprocated back and forth. A plate with a hook-bolt, bolted to the top of the stand, provides for hoisting the stand at intervals to inspect the joint and to apply lapping compound. A handle attached to the plate aids the

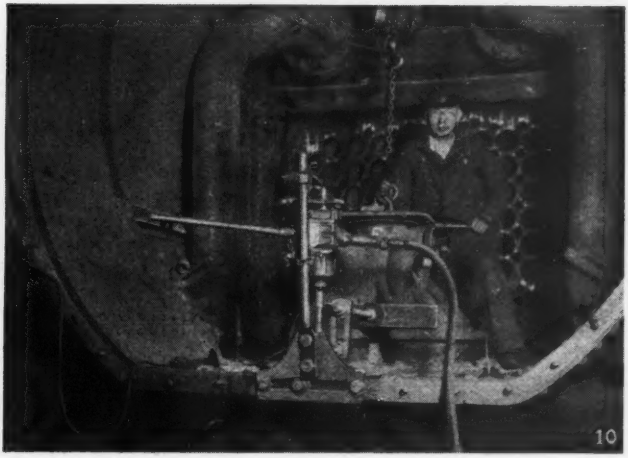
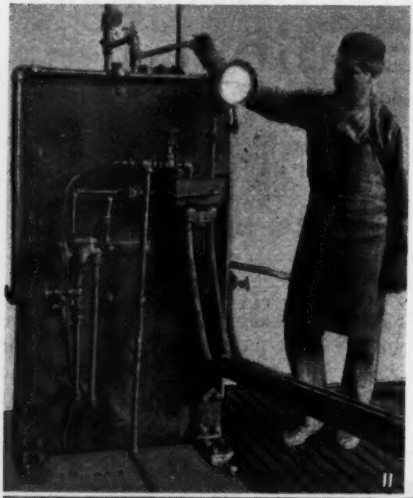


Fig. 10 — Grinding-in a double exhaust stand to its seat.

mechanic in guiding the stand while the operation is in process.

All superheater units are tested to a pressure of 700 lb., before using, by the use of the apparatus shown in Fig. 11. A panel of 1-in. plate serves to support the piping, valves, gauge, and clamping device by which the end of the unit is held in position so that water can be pumped into it. The pressure is built up by the use of a booster pump made from the steam end of an air compressor. The pump is operated by air from the shop air line. The end of the unit is held in position by a fulcrum clamp, the rear end of which is connected to the piston rod of an air cylinder in such manner that the clamp can be operated instantly by the movement of a valve handle.

The illustration Fig. 12 shows a device for testing air pump governors and steam regulators, with a governor in the device, in position for testing. The governor is held in place by the piston of an air cylinder, which forces it tightly against the solid end of the fixture. The end of the piston rod is convex, so that it will fit into one of the open ends of the valve, and the opposite end of the valve fits over a similar connection. Both the piston rod and the connection in the solid end are drilled to permit the flow of



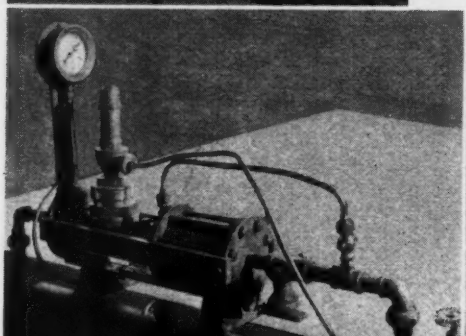
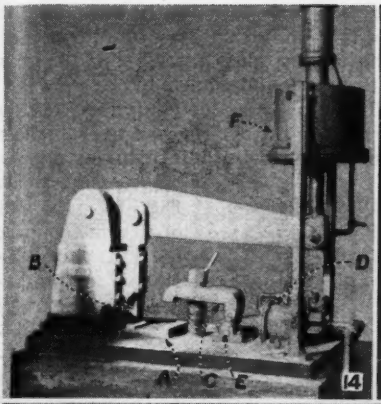
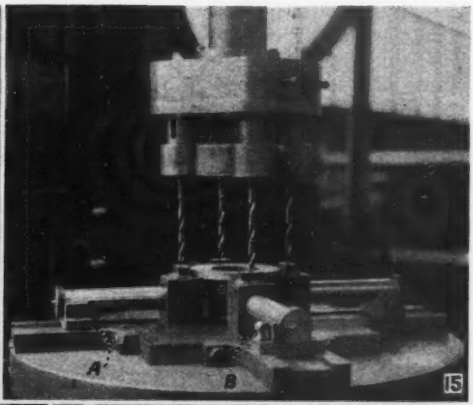


Fig. 11—Superheater units are tested to a pressure of 700 lb. with this equipment. Fig. 12—Device for testing air pump governors and steam heat regulators. Fig. 13—Air-operated fixture for holding piston valve spools while assembling.





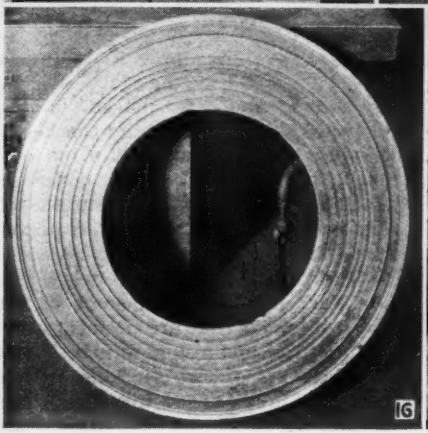


Fig. 14—Air-operated shear for shearing rivets from freight car coupler yokes. Fig. 15—Cotter pin holes are drilled in four spring rigging pins at a time with this equipment. Fig. 16—Jig for assembling duplex piston rings. Fig. 17—A complete assortment of sizes of ring sections are contained in the boxes in the bin section.

air. The cylinder is 4 x 6 in., which is sufficient to provide the necessary pressure. The governor is tested to 130 lb. pressure, which is obtained by the use of a 6½ x 26-in. tank, shown underneath the device at the end of the bench.

Piston valve spools are held, for assembling, in the air-operated fixture shown in Fig. 13. All of the flat pieces used in the construction of the fixture are ¾-in. plate. The clamp is adjustable for height, swiveling on a pin that is made with a handle so that it can be withdrawn and inserted quickly and easily. The power unit is a car air brake cylinder. The use of this device makes it unnecessary to hold the work in a vise or on a table.

In Fig. 14 is shown another air-operated device, consisting of a shear for shearing off rivets on freight car coupler yokes. The yoke is placed on

the plate **A**, in position so that the rivet can be sheared by the knife **B**. The yoke is held in position by the clamp **C**, which is screwed down until the yoke can just be inserted under it. With the yoke in position, air is let into the cylinder **D**, forcing out the piston. The piston rod carries a wedge which passes between the roller **E** and a roller in the end of the clamp, forcing the opposite end of the clamp down onto the work. With the work clamped, air is let into the cylinder **F**, forcing the arm carrying the ram downward and cutting off the rivet.

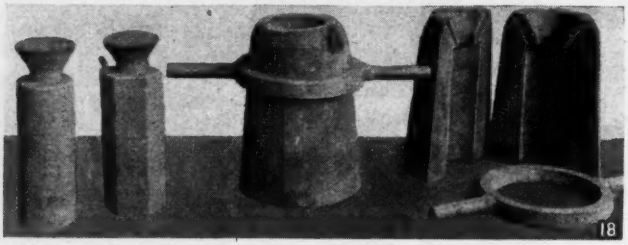


Fig. 18—Cast iron molds used for casting hex and round brass.

Cotter pin holes in spring rigging pins are drilled with the aid of the equipment shown in Fig. 15. A four-spindle drill head is used and four pins are drilled at a time. The pins are held in the fixture by the supports **A**, located by the pins **B**. A series of holes in the base of the fixture at each locating point make it possible to adjust the supports for pins of any length. This jig insures both speed and accuracy.

The only piece of equipment of the kind that the writer has ever seen is the jig for assembling duplex piston rings, shown in Fig. 16. Instead of fitting the ring sections into the groove in the piston, which is largely a cut-and-try job, the sections are selected to fit a stepped circle of the correct diameter in the face of the jig shown and are placed in the grooves afterward. Behind the bench on which the jig is used is a bin section, Fig. 17, containing boxes in which are all the various lengths of ring sections that may be required, which enables the mechanic to select the right sections without delay.

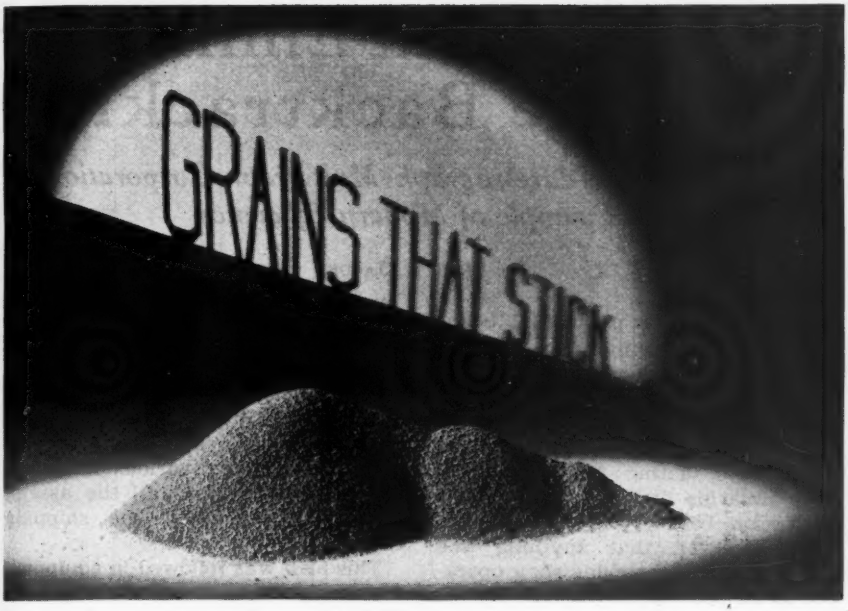
In Fig. 18 are shown some of the cast iron molds that are used for casting hexagon and round brass. Each mold consists of two sections, with a ring that holds them together while the pouring is in process. An assembled mold is shown in the center, with two of the castings at the left.

"How To Make Time and Motion Studies"

Foremen, superintendents, production engineers, and other mechanical executives who are interested in lowering manufacturing costs without lowering wages, stabilizing these costs, and increasing production, will find a store of useful information in a pamphlet "How To Make Time and Motion Studies," which is being issued by Aristo Import Co., 14 John Street, New York, N. Y.

The advantages of a wage incentive system are outlined and the several consecutive steps ordinarily included in the making of a time study, such as preliminary analysis, condition of the work, condition of machine, tools, or equipment, speeds and feeds, and so on, are covered in detail. Instructions are given for the use and manipulation of the stop watch. A sample time study form, filled in as in actual usage, gives the reader a clear idea of the manner in which a time study is made. Finally, the reader is told how to arrive at a "standard" time, and how to compute the bonus or piece-work allowance.

Any mechanical executive can obtain a copy of the pamphlet without charge by addressing a request to the Aristo Import Company at the above address.



High Capillarity Grains Make Strong Polishing Wheels

NORTON POLISHING ABRASIVES

CAPILLARITY is one property of abrasives which largely determines the strength of a polishing wheel.

High capillarity grains make strong wheels because the glue is spread evenly through the grains. Each grain is held firmly, as securely as its neighbor.

Norton polishing abrasives are specially treated to raise their capillarity; and so handled that this capillarity is maintained. They stick firmly in the wheel head until all their work is done.

NORTON COMPANY
Worcester, Mass.

Correct Layout Eliminates Excessive Backtracking

New Plant of Addressograph-Multigraph Corporation Is Example of Modern Efficiency

By FRED B. JACOBS

WHILE quantity production as applied to machine shop practice has made enormous strides during the past few years, quantity production in itself is nothing new. As a matter of fact, in the United States it is a century old, dating from the time when firearms first were made on a production basis. It is safe to assume, however, that anything like real progress in machine shop operation on an economical basis was practically unknown until about twenty-five years ago.

The cost of making any machine-shop product can come under three general heads: cost of materials, cost of labor, and overhead. In modern manufacturing, overhead costs are important items and if there is one item above another that increases overhead, it is the improper routing of the work through the shop. The modern plan is to have the work flow through the shop in as nearly straight lines as possible, for every unavoidable backtrack means an added expense.

To route work properly through one of the older factories is a serious problem, as the design of the building generally offers unavoidable obstacles. When a new plant is constructed, however, the plant engineers have an excellent opportunity to lay out the plant to handle a certain product. Thus, long before the ground is broken for the plant, the engineers have on paper adequate plans showing just how the factory layout is to appear, where each machine is to be installed, and routes to show how the work will progress from the raw stock through the various manufacturing departments until the assembled machines reach the shipping room.

This plan was followed in equipping the new plant of the Addressograph-Multigraph Corporation, Cleveland, Ohio. The company manufactures about fifty types of addressing and multigraphing machines, so millions of separate parts, from comparatively large castings to small punch press products, pass along the production lines annually.

The new plant is one story high, of steel and brick construction, and is 620 by 480 feet. It has a floor space of approximately seven acres and is located on a 30-acre tract to allow plenty of room for expansion. The plant is divided into eight 60-foot bays, which run the entire length. The roof is of the approved saw-tooth type with windows facing the north so that adequate daylight is assured for the entire day, except, of course, during the winter months when artificial lighting is necessary toward the close of the work-day.

This factory building houses the various manufacturing departments,

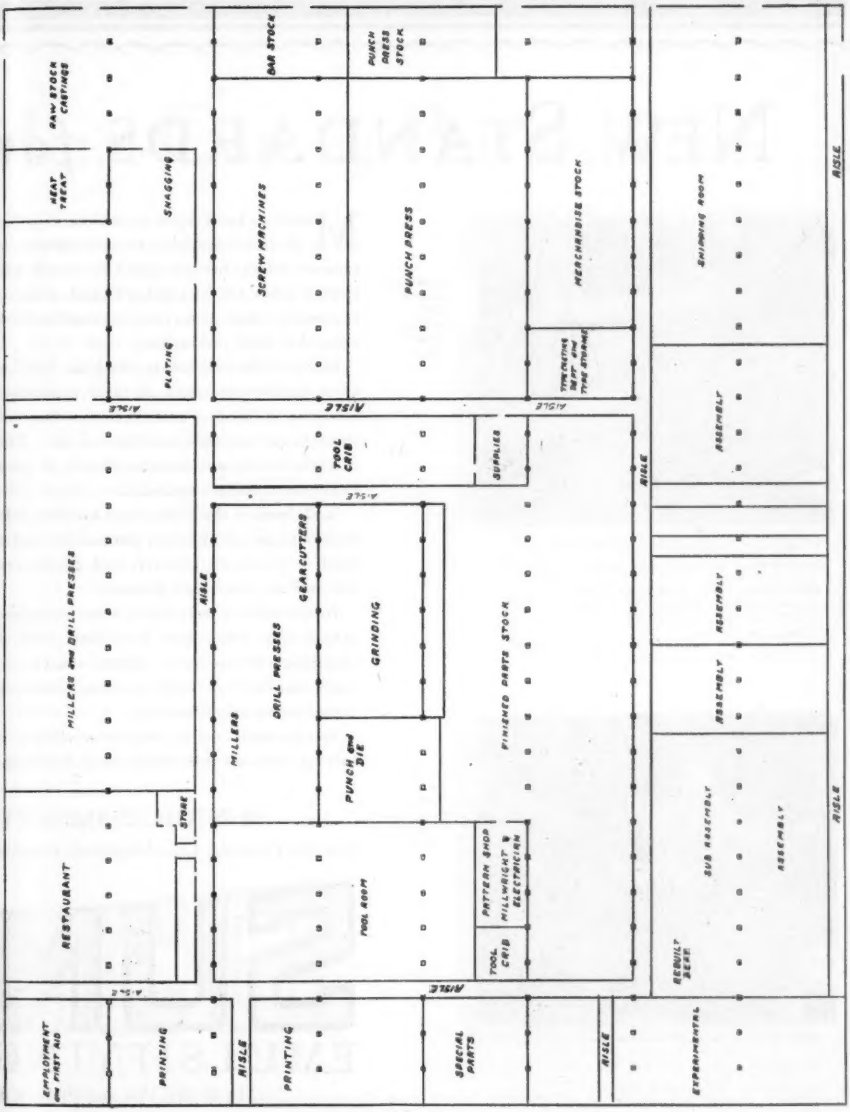
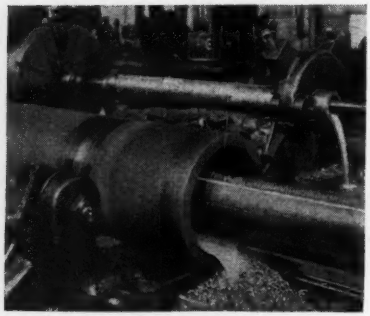


Fig. 1—Departmental Division of New Plant of the Addressograph-Multigraph Corporation.

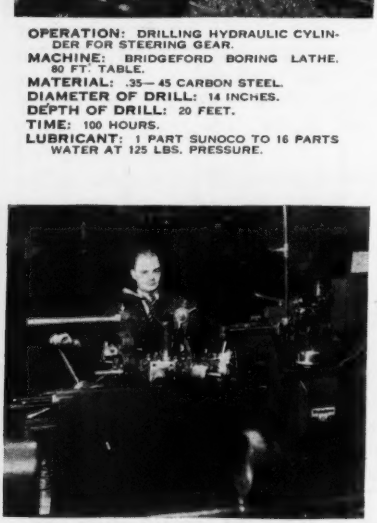
stock, shipping, and receiving departments, first aid room, a store for the accommodation of the employes, and a cafeteria. The general layout is shown in Fig. 1. The major machine tools in operation in the various pro-

NEW STANDARDS *for*



Courtesy of Camden Forge Company, Camden, N. J.

OPERATION: DRILLING HYDRAULIC CYLINDER FOR STEERING GEAR.
MACHINE: BRIDGEFORD BORING LATHE. 80 FT. TABLE.
MATERIAL: .35—45 CARBON STEEL.
DIAMETER OF DRILL: 14 INCHES.
DEPTH OF DRILL: 20 FEET.
TIME: 100 HOURS.
LUBRICANT: 1 PART SUNOCO TO 16 PARTS WATER AT 125 LBS. PRESSURE.



Courtesy of Warner & Swasey Company, Cleveland, Ohio

OPERATION: TURNING, BORING, FACING AND FORMING FRICTION WORM GEAR.
MACHINE: NO. 4 WARNER & SWASEY TURRET LATHE.
MATERIAL: ALUMINUM BRONZE.
TOOLS: TUNGSTEN CARBIDE.
SPEED: 500 FEET PER MINUTE.
FEED: .010 INCH.
STOCK REMOVAL: 3/4 IN. ON ALL SURFACES.
TIME PER PIECE: 2½ MINUTES.
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER.

Machine Tools built to maintain a production schedule can only operate to capacity when they are aided by an efficient cutting lubricant. In today's rigid program of economy there is no place for cutting lubricants that delay production.

For its ability in aiding Machine Tools to keep production speed up and production cost down, Sunoco is gaining new recognition throughout the metal working industry. This recognition is based, not upon theory, or price, but upon actual performance.

With Sunoco the high speed modern lathe maintains its schedule, an unusual amount of work is produced between tool grinds, and the cuts are clean and accurate.

In the milling operations, more pieces per grinding of the cutter, less "lost" time in changing cutters, fewer chatter marks, and more satisfactory work are the results obtained when using Sunoco.

Sunoco aids metal sawing machines in cutting through bar stock, tool steels and

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SUN OIL COMPANY, LTD., Montreal, Canada.

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Metal Cutting Performance

stainless steels, cutting off clean and straight. It insures accurate cuts with long blade life.

The heat absorbing properties of Sunoco permit Tungsten Carbide, Tantalum Carbide and other non-ferrous small tools to take heavy cuts at super speeds.

The use of a properly balanced grinding fluid is necessary if your abrasive wheels are to remove metal quickly, smoothly and accurately. Sunoco has introduced new efficiency in the grinding operation. It has actually made possible faster stock removal without increasing wheel wear. Production accuracy is assured with more pieces per abrasive unit.

A trial in your own plant, under your own operating conditions, will convince you that Sunoco is the one outstanding economical cutting lubricant. Our cutting oil engineers—of wide contact and experience—are at your service for surveys, consultation and recommendations.

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BRITISH SUN OIL CO., LTD., London, England

OCO

CUTTING OIL

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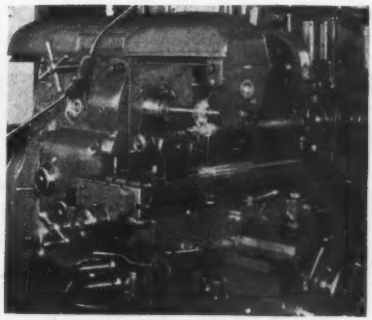
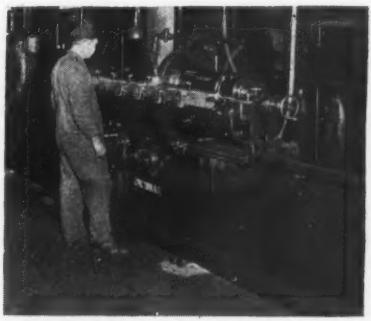
Courtesy of Cincinnati Milling Machine Company, Cincinnati, Ohio



OPERATION: MILLING KEYWAY ON SHAFT.
MACHINE: NO. 2 CINCINNATI MILLING MACHINE.
MATERIAL: STEEL FORGING.
CUTTER: 4 INCH—51 R.P.M.
FEED: 3 5/8 INCH PER MINUTE.
WIDTH OF CUT: 3/8 INCH.
DEPTH OF CUT: 3/16 INCH.
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER.

Courtesy of Cincinnati Grinders Inc., Cincinnati, Ohio



OPERATION: GRINDING INK SPREADER
MACHINE: 12 INCH X 96 INCH PLAIN SELF-CONTAINED CINCINNATI GRINDER.
MATERIAL: SEAMLESS TUBING. 1/8 INCH WALL.
WHEEL: 20 INCH X 2 INCH.
STOCK REMOVED: .020—.025 FROM DIAMETER.
TIME: 27 MINUTES. COMPLETE.
LUBRICANT: 1 PART SUNOCO TO 40 PARTS WATER.

duction departments include the following:

Type of Tool	Quantity
Lathes	15
Milling machines	81
Drilling machines	84
Hand screw machines	33
Automatic screw machines	42
Grinding machines	30
Punch presses	104

Fig. 2—Grinding Department. An exhaust system removes the dust from the machines.

Type-casting machines	39
Gear shapers	6
Gear hobbers	8
Tanks, various	26
Tumbling barrels	9
Gas and Electric ovens	3
Generators	2
Miscellaneous machines	35
Rheostats	6
Exhaust systems	1
Dust-collecting systems	1
Total	525

The entire plant floor is of woodblock construction, while all aisle spaces are designated by metal disks spaced about four inches apart. Stock is not allowed to accumulate in the aisles or even be stored there temporarily. The entire shop is open and without partitions except for brick partitions around the enameling, heat treating, snagging and plating departments. Due to the fact that the parts handled are comparatively small, no conveyor system is necessary. Parts are trucked from one department to another on modern lift trucks.

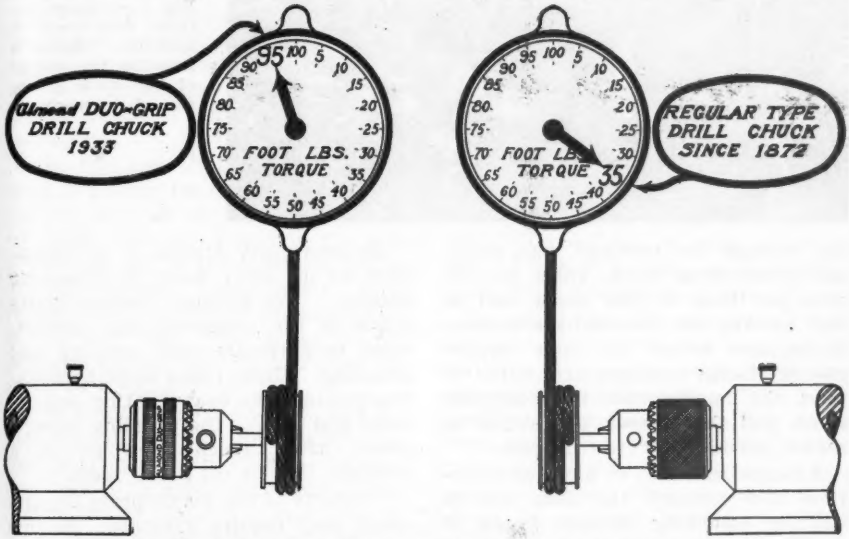
A good idea of the machine installation can be had from Figs. 2, 3, and 4. Fig. 2 shows part of the grinding department. The equipment is arranged to allow plenty of floor space, while an adequate exhaust system is provided to take care of the abrasive dust from the tools that are operated dry. Fig. 3 is the screw-machine department, and a very important production unit, as millions of small cylindrical parts must be provided annually. Both milling and drilling machines are shown in Fig. 4. Here also is shown the type of platform handled by the lift trucks.

It is, of course, practically impossible to lay out a manufacturing plant so that absolutely no backtracking is necessary. However, in the plant in question, backtracking has been reduced to a minimum. Refer to Fig. 1. At the extreme right, adjoining a platform and extending the entire width of the plant, is a railroad siding connecting with the main line of the New York Central Railroad to the north and the Nickel Plate Railroad to the south. On this platform several carloads of freight can be loaded or unloaded simultaneously.

At the right in Fig. 1 is shown

BY COMPARATIVE TESTS

GREATER GRIPPING—EASY RELEASE



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In every instance this new Almond Chuck has proven itself vastly superior to the Best Performance of any previously known Chucks of the same General Type.

J. R. Almond Mfg. Co.,

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Fig. 3 — Screw machine department in operation. Space is provided for storage of bar stock at the rear of the machines.

the storage for castings, bar stock, and punch-press stock. These are the principal items of raw stock, and as fast as they are received the various items are stored in their proper places. Large castings are stored in piles, the smaller ones in boxes. Bar stock and sheet stock are stored in racks provided for the purpose.

An excellent idea of how the materials flow through the shop can be had by following various types of stock. When castings of a certain type are released on a shop order they go first to the snagging department, then to the enameling department and from there to the milling or drilling departments. If gear cutting or grinding is necessary on any cast parts, it will be seen by reference to Fig. 1 that the parts flow through these departments in straight lines, from storage to the stock room.

Bar stock naturally goes to the screw machines. Referring to Fig. 1, it is shown that the storage for this material is directly back of the machines. If all the necessary operations can be performed in the screw-machine department, the stock goes down a cross aisle into the finished parts stock. If gear cutting or grinding is necessary, the parts stop at these departments, which are off the aisle that leads to the stock room.

As previously stated, it is impossible to do away with backtracking entirely. For example, certain parts made in the screw-machine department may require heat treating and grinding. These parts must be backtracked into the heat treating department and then to the grinding department, after which they go in a straight line to the store room.

Products of the punch-press department may require grinding. In this case they must be backtracked around the tool crib to the grinding department. Again, parts of any description that require plating and polishing must be backtracked. Thus the only departments where backtracking is necessary are the heat-treating, plating and polishing. A study of the layout will readily show why backtracking cannot be eliminated without installing a number of small plating, polishing and heat-treating departments in the production lines, and, of course, this would not be practical.

Clerical work pertaining to the receiving of all stock is done in the receiving room. Merchandise stock is kept in the department next to the receiving room. This stock comprises all units that are purchased ready made, such, for example, as electric motors.

The type-casting and type-storage

department contains the thirty-nine type-casting machines previously mentioned. On these machines is cast the metal type used in setting up copy for multigraph machines. The type-casting machines are of the monotype variety; that is, they cast one letter or character at a time and are not unlike the type-casting machines seen in any large printing plant.

The tool crib contains all the tools used in production as given out to the various men on check, while supplies of small tools are stored in the supply at the end of the tool crib. Drills, milling cutters, counterbores, spotfacing tools, and so on, are sharpened in the tool crib. This saves the expense of taking them to and from the main tool room.

The location of the punch and die department next to the grinding department calls for a word of explanation. In this department are maintained the punches and dies used in making the plates and frames for addressograph machines. In other words, it is a special department for a specific purpose.

In the tool room are made special tools such as jigs and fixtures, punches, dies, and other special tools used on the regular production work. Tools also are repaired in this department. For example, considerable die grinding is going on from time to time to keep the 104 punch presses in constant production. As Fig. 1 shows, the tool room has its own tool crib so that the tool makers do not use the tools employed on regular production; neither is time lost going half way down the shop to the main tool crib.

The pattern shop, millwright and electricians' department, the rebuilt department, and the experimental departments are out of the main line of production, as can be seen by reference to Fig. 1, as they have nothing to do with production proper.

The final assembly department was laid out to expedite the erecting of the various types of machines of the company's manufacture as much as possible. Materials from the stock room go to the sub-assembly where parts of complete units are put together. These sub-assemblies then travel on to the small assembly, where the work is completed. After assembling and testing under practical working conditions, the finished machines go to the shipping room.

The products of the Addressograph-Multigraph Corporation are made to very accurate limits, and as a manufacturing proposition, are in the same

(*Continued on page 20*)

Fig. 4—All stock is handled on platforms that can be moved by lift-trucks, thus keeping the material in order, preventing loss or damage to the parts, and keeping the floor and aisles clear.

Short Cuts in Toolmaking With An Electric Welder

A paper submitted for the Second Lincoln Arc Welding Prize Competition, sponsored by The Lincoln Electric Company, Cleveland, Ohio.

By H. K. GRIGGS
Machine Shop Foreman, The Portland Company, Portland, Me.

THE electric welder can show the greatest profit in toolmaking in the ordinary machine shop. Figure 1 shows the design of a roughing reamer that is used to ream cored holes in cast iron boilers preparatory to reaming with a 3-in. pipe tap reamer. The body of the reamer is of machinery steel. One end is turned to No. 5 Morse taper and the other end has four slots milled in it to take four blades, as shown. Blades of high speed steel were made, hardened, and welded in place. The heat generated in welding did not seriously affect the hardness of the blades, although they could be hardened after the welding was done, if preferred.

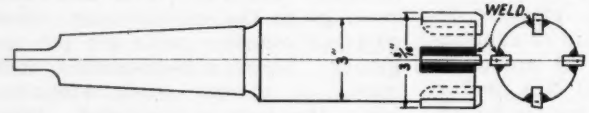

Fig. 1—Four-blade roughing reamer with blades welded in.

The body of this particular tool was made from material taken from the scrap pile, so actually cost practically nothing. The cost of the high speed steel was fifty cents, and the twelve hours of time required, at sixty-five cents an hour, made the total cost less than $10.00. By making this tool, the company was able to avoid the purchase of a tool that would have cost $100.00. Any size of reamer can be made by this method, and when the blades are worn, the welds can be chipped off and new blades inserted.

Figure 2 is a drawing of a milling cutter that was used to split a 4-in. square steel bar for a distance of 3 ft. The body of the cutter is a circular disc of ⅜-in. boiler plate, with a steel washer welded to each side to

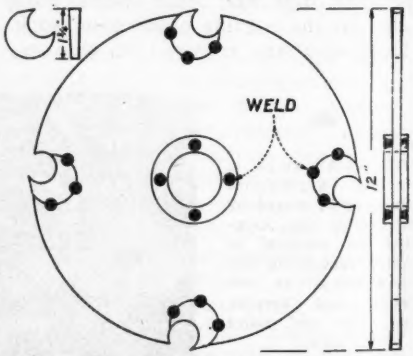

Fig. 2—Milling cutter with body of boiler plate and high speed steel cutters, welded in place.

form the hub. The high speed steel teeth which were of circular shape, were bored as shown to provide chip-space and milled flat back of each tooth for clearance. With the teeth clamped in position, ⅜-in. holes were drilled, half in the body and half in the teeth, and the teeth were secured by welding through these holes, as shown. The total cost of this cutter was less than $10.00, whereas the only cutter that could be purchased for this job would have cost $75. None of the teeth loosened, although a tooth was broken before the job was completed.

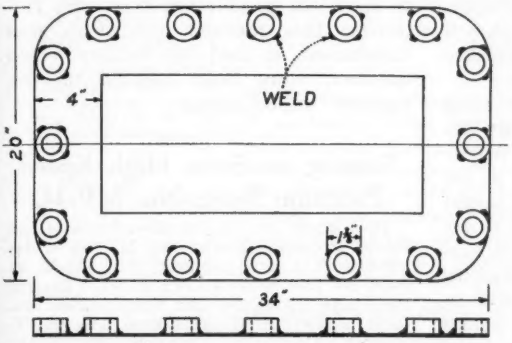

Fig. 3—Drilling jig of steel bars welded together, with hardened steel bushings welded in position.

In Fig. 3 is shown a drilling jig that is composed of four pieces of 4 x ¼-in. steel bars, welded together to form a frame. There are 16 hardened steel bushings, the locations for which were laid off and then 11/32-in. holes were drilled for ⅜-in. stove bolts with which the bushings were held in place. After locating the bushings accurately by the use of distance pieces, in the usual manner, each bushing was welded to the frame by applying the weld in four spots, as shown. The jig weighed 15 pounds and the total cost was $15. A similar cast iron jig weighs 80 pounds and costs $75. An advantage of the steel jig is that it is less liable to be broken.

The drawing Fig. 4 shows the design of the lower half of an automatic sprinkler dry pipe valve. The valve is a casting with three holes, one of which is shown at **A**. The holes are for hand hole plugs, each 4 in. in diameter with 14 threads to the inch. Constant use resulted in the threads being worn out. No tap being available, the only way to re-thread the holes was to fasten the casting to the faceplate of a lathe, for which a fixture was necessary. A cast iron fixture would cost, pattern included, over $40 and cause a two-day delay.

Two pieces of 3 x ⅜-in. angle steel were cut, bent, and welded as shown at **B**, and a brace of 1 x ⅜-in. steel was welded on each piece. After mounting the fixture on the faceplate of a 30-in. lathe, a bar was welded on, connecting the two angles. Scrap material was also used for this job, which, together with four hours' time at 65 cents an hour, made the cost less than $3.00.

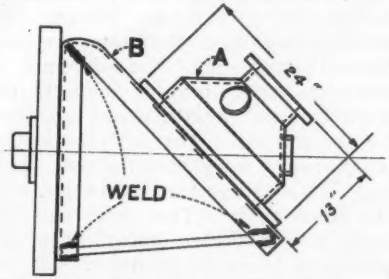

Fig. 4—(A) Drawing of lower half of automatic sprinkler dry pipe valve. (B) Drawing showing piece mounted on lathe fixture to have holes for hand hole plugs re-threaded.

These examples are but a few to

show the application of the welder to toolmaking in the machine shop. The use of the electric welder will enable the small jobbing shops to produce tools and to turn out jobs in competition with the special shops. It will also enable the special tool shops to manufacture tools economically.

The design of machines and tools are constantly changing, and any design, whether for welding or otherwise, is soon out of date and is replaced by something else. What might be profitably constructed today is obsolete tomorrow. It makes no difference whether we travel by automobile, airplane, or sky rocket, tools will be needed and in future years the welder will play a leading part in tool production.

Correct Plant Layout

(Continued from page 17)

class with high-grade gun, rifle, sewing machine, typewriter and adding machine work. Thus a word about inspection will not be out of place. Inspection is in process continually as the various parts are made. Thus defective parts can be thrown out before subsequent operations are performed on them. For example, a screw-machine operator inspects his work frequently with gages provided for the purpose. The same is true of punch-press work, drilling and milling. Final inspection takes place in the stock room. That is to say: all parts are inspected before they are placed in stock to be drawn out for assembly or for shipment as spare parts.

The plant in question is a splendid example of a modern machine shop devoted to what is generally termed light manufacturing, although several comparatively heavy machines are constructed. The system in use as explained in this article is the result of laying out the plant on paper, placing little cardboard "cut-outs" representing the machines in their correct places, and then tracing lines to show the production flow. By following this method, confusion was eliminated, so that the factory, when finished, more than fulfilled the designers' expectations.

Catalog on Swiss High Speed Precision Borer No. MP-3C

The latest model of the Swiss High Speed Precision Borer No. MP-3C is described in a new catalog, No. 534-A, issued by the Societe Genevoise d'Instruments de Physique and obtainable from their American distributors, The R. Y. Ferner Company, Investment Bldg., Washington, D. C.

The catalog illustrates the machine with motor mounted vertically on one side, directly connected to the vertical drive shaft. This borer has capacity for jobs approximately 14 x 20 x 14 inches in size, and will bore holes as large as 4 inches or drill them as small as No. 60 drill. Various accessories for easy setup and measurement of jobs are shown, including a rotary tiltable table which provides for boring five sides of a box jig at one setting.

Copies gratis.

Westinghouse A. C. Welder Bulletin

The Westinghouse 100 ampere FlexArc A.C. Welder is described in a new leaflet published by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

Rated at 220-440 volts, 50-60 cycles, single phase with current range of 4 to 125 amperes, this welder meets the great demand for the economical arc welding of thin gauge material such as that encountered in the manufacture of metal furniture, sheet steel cabinets and containers, in aircraft fabrication work, job and garage repair work and in the fabrication and erection of ventilating systems and materials handling equipment of many kinds.

The publication describes the construction, operation and distinctive features of this new welder.

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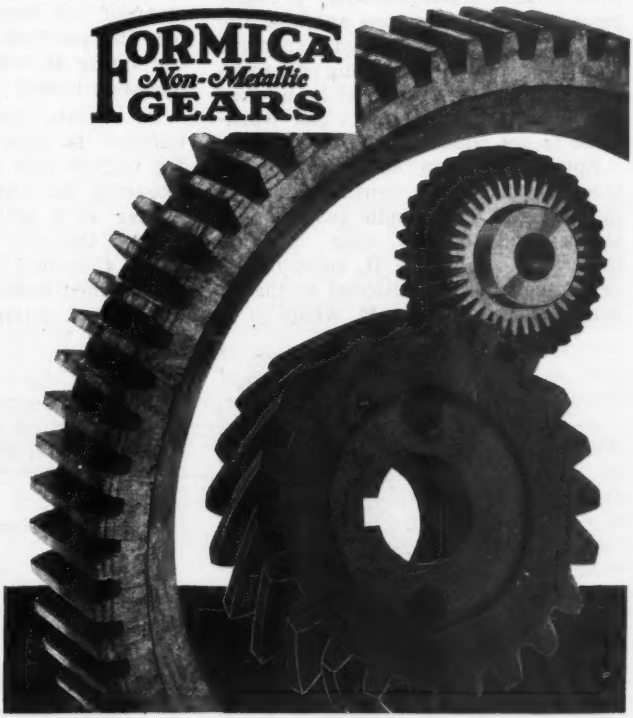

Lamont Gear & Mch. Co. Philadelphia, Pa.
The Pittsburgh Machine & Supply Co., Pittsburgh, Pa.
Standard Gear Co. Pittsburgh, Pa.
The Turley Gear & Mch. Co., St. Louis, Mo.

Perkins Machine & Gear Co., Springfield, Mass.
Winfield H. Smith, Inc. Springville, N. Y.
Alling Lander Company Sodus, N. Y.
Arlington Machine Co. St. Paul, Minn.

Diefendorf Gear Corp. Syracuse, N. Y.
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IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . We will pay for each one published.

An Accurate Indexing Fixture

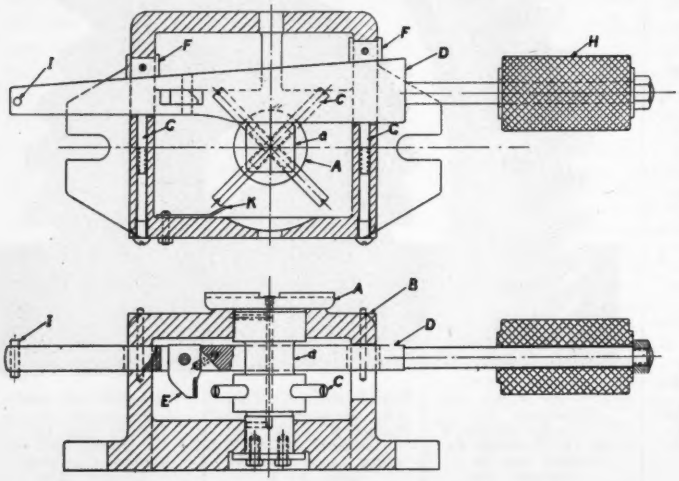
By R. W. MUERLE

THE drawing shows the design of an indexing fixture that was made for use in milling the teeth of small clutch sleeves. The fixture is used with a hand miller, finishing a single piece at a time and thus avoiding the necessity for a large and expensive operating pin and bushing arrangement and clamp that must be worked for each indexing step. The work-piece is not shown in the illustration.

Spindle **A**, upon which the work-piece is located, is centrally located in casting **B**. The spindle has a square shank and carries four indexing fingers **C**. A wedge **D**, carrying indexing cam **E**, is positioned so that it slides in the casting **B**, where it is held against the hardened steel blocks **F** by means of the spring plungers **G**.

The wedge **D** is provided with a handle which serves as a slide for the hammer **H**, providing means for setting the wedge firmly in position and also for loosening it when necessary to index the work-piece. Pin **I** prevents the wedge from being pulled clear of the fixture. The spindle is held in position, after indexing, by the spring **K**, which holds it until it has been locked by the wedge.

To operate, the operator slides the hammer **H** back against the nut at the cutter end of the handle, thus loosening the wedge and pulling it out as far as it will go. In this same motion the cam **E** carries the index finger **C** around 90 degrees. The operator then slides hammer **H** toward the fixture, driving the wedge firmly into place and clamping the spindle firmly and accurately for the milling of the next tooth. The operator usually works with one hand on



An Accurate Single-Piece Indexing Fixture for use in milling teeth in small clutch sleeves.

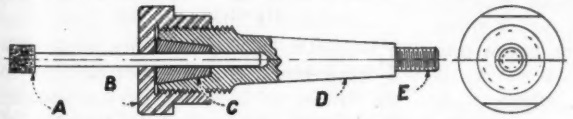
the sliding hammer **H** and the other on the feed lever of the machine until the work-piece is finished and is ready for removal from the fixture. The number of indexing steps can be varied by providing the corresponding number of fingers and flats on the shank for contact with the wedge.

Rigid Chuck for Holding Small Grinding Wheels

By F. J. WILHELM

THE illustration shows the design of an unusually rigid and efficient chuck to hold ready-mounted small grinding wheels, such as is indicated at **A**. The wheel spindle is held in the chuck by tightening the lock nut **B**, which forces in the collet **C**, thus gripping the spindle. The lock nut **B** is made with a left hand thread to fit a corresponding thread on the shank **D**, and has flats milled on opposite sides to accommodate a wrench. The Collet **C** is in two parts, and is made with a 15 degree taper, the same as the taper in the shank, so that it will close in on the spindle when the nut **B** is tightened.

The shank **D** is tapered to fit the spindle of the machine with which it is to be used. The chuck made from the design shown in the drawing was used in a Rivett grinder, thus necessitating a stud with left hand thread as indicated at **E**. The chuck can, however, be applied to practically any type of grinder by making the shank



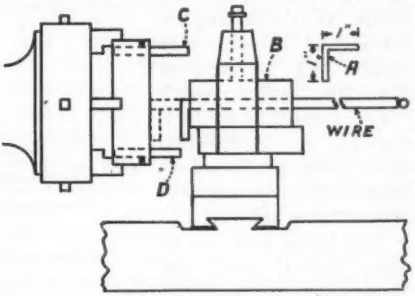
Rigid Chuck for Holding Small Grinding Wheels

to fit the machine-spindle. The chuck was designed originally to hold wheels for grinding $\frac{3}{16}$-in. and $\frac{1}{4}$-in. holes in master plates, and for fine die work.

Bending and Cutting Off Pins in the Lathe

By CHARLES KUGLER

GIVEN the job of bending and cutting off a large quantity of $\frac{3}{16}$-in. pins, a small shop performed the operation by using the equipment shown in the drawing. The pin was to be bent at right angles, to measure



Tool for bending and cutting off pins in the lathe.

one inch each way from the bend, as shown at **A**. A lathe was used for the job, and provision was made for holding the stock by drilling a $\frac{3}{16}$-in. hole through a block of tool steel. The block was hardened to reduce wear to the minimum, then it was clamped in the toolpost of the lathe, as indicated at **B**, so that the stock could be fed through by hand.

A steel disc was drilled, at opposite sides, to take the toolbits **C** and **D**. Setscrews were used to hold the toolbits in place. The toolbit **C** was ground and provided with rake and clearance so that it could act as a shear, and was inserted into the disc just far enough to clear the end of the block **B**. The toolbit **D** was rounded on the end so that it would bend the stock without cutting it, and was set to clear block **B** by slightly more than

$\frac{1}{16}$ in., to produce as sharp an angle as possible.

The cross slide was clamped so that a 1-in. gap was left between the face of the disc and the end of the block **B**; thus the disc acted as a stop for the stock. By feeding the stock against the disc and then revolving the spindle, the bending tool **D** first bent the stock at right angles, then the stock was again fed in against the disc, after which the cut-off tool **C** sheared it. A finished piece was produced at each complete revolution of the spindle.

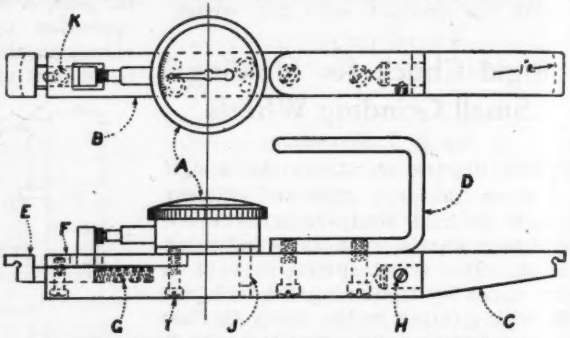
The lathe was run at slow speed, with the back gears in, until the boy who was working on the job became familiar with the operation, then the speed was increased. It is evident that the speed of the lathe determines the production.

Internal Gage with Indicator Attachment

By DAVID GRIFFITH

THE tool illustrated was made up for use in determining the concentricity of holes in dies, and has repaid its cost many times over. It consists of a gage with interchangeable arms so that it can be adapted for use in gaging holes of varied sizes, and with an indicator for quick and easy reading. The indicator, **A**, is mounted on the tool, **B**, where it is held firmly in place by the filister head screw **I** and the dowel pin **J**. The detachable gage arm **C** can be removed by loosening the setscrew **H**, and any one of a number of arms of different lengths can be applied, according to the size of the hole to be gaged.

To facilitate handling of the gage, a handle, **D**, made of cold rolled steel and bent to the shape shown in the drawing, is anchored in place with filister head screws. The movable



Drawing showing design of internal gage with indicator attachment

anvil **E** slides in a slot in the body of the tool, where it is held in place by the plate **F** and is guided by the filister head screw **K**. A slot in the plate **F** allows the vertical section of the movable anvil **E** to project vertically so that it can contact with the spindle and thus control the movement of the hand on the dial. The spring **G** forces the movable anvil **E** out so that it will maintain contact with the work.

Reducing Costs in the Manufacture of Blades

By GEORGE BIRD

FIGURE 1 is a drawing of a cutting blade that is spot welded to the frame of a paper carton opener. The opener is hooked to the top of a paper carton in such manner that the blade can be drawn toward the operator with a sliding motion, severing the top of the carton. Inasmuch as the blade must be of such material

that it will hold a keen edge, it is made from 0.080-in. high carbon knife blade steel.

The blade was originally blanked out of flat stock, after which it was rough ground on an emery wheel by hand. Then it was hardened and finish-ground, also by hand, the whole comprising a slow and more or less inaccurate job.

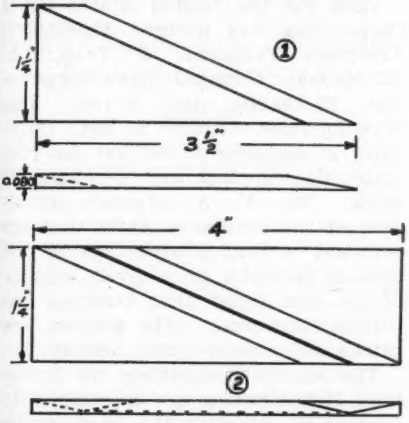


Fig. 1—Drawing of blade for paper carton opener. Fig. 2—Showing how two blades are made from a single piece, reducing manufacturing costs.

In the drawing Fig. 2 is shown the improved method of making the blade. A rectangular section 1¼ x 4 in. is cut out with a plain shearing die, then the section is placed in a simple milling fixture and a "V" is milled across at the proper angle, as shown. A form milling cutter is used to mill the groove, the depth of the groove being such that approximately 0.010 in. of stock is left at the bottom. The two blanks are left attached in this manner until after the hardening operation, then they are broken apart and the edges are ground to the required sharpness.

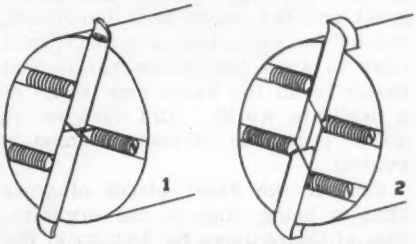
It was found that not only were costs reduced on the manufacturing operation, but that better results were obtained due to the fact that the edges were not so liable to be damaged in the heat treating. The finish grind operation took no longer than it had previously, as there was only 0.010 in. of stock to be removed.

"Kinks" for the Boring Tool Designer

By CHARLES H. WILLEY

THE idea presented in the accompanying illustration, while simple, will be extremely useful to the draftsman who is called upon to design a boring bar in which the tools are to be adjustable. In the design shown in Fig. 1 the cutters are of round tool steel, ground to the same length and tapered at the inner end so that they can be adjusted by means of a conical-pointed setscrew. Setscrews are also provided to lock the tools in position after setting. This type of bar is easily made, requiring only the drilling of one hole through the bar for the cutters and the drilling and tapping of three holes for the setscrews.

The design shown in Fig. 2 is more elaborate. Square toolbits are used, necessitating the broaching of a square hole. Each toolbit is ground at an angle at the inner end, and an adjusting screw, as well as a locking screw, is provided for each cutter. In this case it is not necessary that the cutters be of the same length, as each cutter can be adjusted individually.



Drawing showing methods of providing adjustment for cutters in boring bar

Over the Editor's Desk

IN many respects, the situation that exists today is a duplicate of the situation that existed in the autumn of 1921. Unmindful of the evidences of economic improvement, those who otherwise would be optimistic are finding it difficult to escape the crepe-hanger whose song is to the effect that the day of high wages and high prices is over.

In 1921 the report was current—and generally believed—that the machine tool and cutter business would be dormant for the next five years. It was just about this time that the government dumped onto the market a vast quantity of tools and supplies that had been left over from the war, the effect of which was to plunge the already discouraged tool manufacturers into deeper gloom. But the five years was shortened to less than two, and almost before they knew it, orders were riding the mails and business had returned to normal.

This country has come through nineteen major depressions, each of which preceded new high levels of prosperity. The last one has been the worst one; buying has been suspended so long that the needs are great and the wants have multiplied, but by the same token, industry will have to work that much harder and faster to fill the needs and wants of a destitute world. And even as we go to press the increased tempo is evident.

One of the finest pieces of work that is being done is the organization of Committees for Industrial Rehabiliation in each Federal Reserve District and each industrial section of the country. The committees are composed of responsible business men who are giving their time, without pay, to the work of obtaining pledges of capital expenditures for new equipment, repairs, or other needed improvements in which the employment of labor will be involved.

Thus far the United States Steel Corporation has pledged $5,000,000; American Telephone & Telegraph, $35,000,000; National Steel Corporation, $1,000,000, and so on. The Westinghouse Electric & Mfg. Company is spending $1,260,000 for raw materials, supplies, and development work. Mr. F. A. Merrick, president of the company, states that his company is taking advantage of the present favorable price levels because of his firm belief that business has turned the corner. The present low prices will soon be past history.

The section Committees for Industrial Rehabiliation are meeting with success in obtaining the co-operation of the banks, which means that capital is available. And raw materials are, at the present moment, cheap. Modernization of equipment is important—as the manufacturers who have neglected it will soon discover. The progress in the design of machinery and tools that has been made in the last ten years has rendered obsolete practically every machine that is more than ten years old. The newer types of machines turn out better work, turn it out faster, and at lower costs. There are hundreds of cases where manufacturers could actually save money by throwing out old machine tools and replacing them with new ones.

Look over your plant; examine each individual machine and settle once and for all the question as to whether it is paying for its keep and returning a profit, or whether it is just keeping a good, productive, profit-making machine out of a job. If you need a new machine, buy it while the buying is good.

NEW SHOP EQUIPMENT

Natco Station-Type Hydraulic Feed Multiple Spindle Driller

The National Automatic Tool Company, Richmond, Ind., is offering to the metal working industries a station-type hydraulic feed multiple spindle driller which is new in design in many respects. The development of this machine clearly shows that Natco is thoroughly convinced that better times are ahead and that factory executives and engineers will demand better and thoroughly modernized drilling machines with greater cost reducing possibilities.

This machine is to be known to the trade as the Natco station-type hydraulic driller. It may be arranged with either six or eight stations, and horizontal as well as vertical hydraulic feed drilling units. The particular machine shown is arranged with six (four working and two loading and unloading) stations. It is arranged with four vertical and four horizontal drilling heads.

The indexing of the table from station to station is accomplished by an automatic mechanical indexing mechanism and the entire machine is so interlocked that the indexing mechanism will not function unless all heads, both vertical and horizontal, are in their correct positions. The machine is equipped with the Natco Hydro Uni-Power system of hydraulic feed. It is semi-automatic in operation and the operator has complete control of the machine through the use of one push button station. All heads are of the new Natco quick change type and all spindles are roller bearing mounted and arranged with nose adjustment.

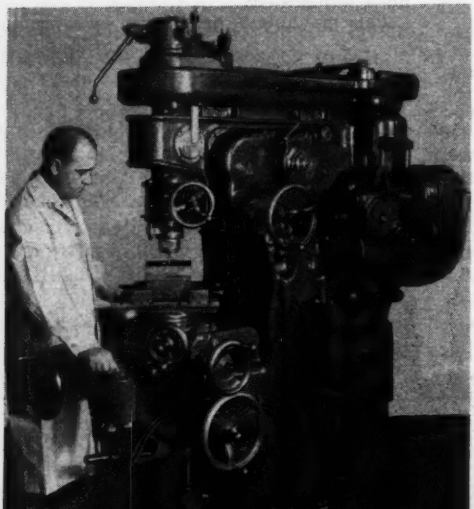
This machine is being used by a prominent manufacturer of low-priced cars for performing a total of 132 different drilling and countersinking operations in the bottom and manifold side of a cast iron cylinder block, at an approximate rate of 75 per hour.

Approximate weight of this machine is 62,000 pounds.

Natco Station-Type Hydraulic Driller.

Pratt & Whitney No. 2A Universal Die Sinker

Pratt & Whitney Company, Hartford, Conn., has placed on the market a die sinking machine to be known as the No. 2A Universal Die Sinker. The machine is a distinct departure from previous die sinkers, and contains new features which have greatly speeded up die production.



Pratt & Whitney No. 2A Universal Die Sinker

Savings up to 75 per cent have been recorded in regular production with this machine. In general work range dimensions and vertical design the machine is similar to the Pratt & Whitney No. 2 Die Sinker.

The No. 2A machine applies a new idea to die making; that of making cherrying cuts without special attachments or special cutters, and using power to feed the cutter. Thus a difficult hand operation is converted into a quick machine operation, and the use of costly cherrying cutters is eliminated. Standard die sinking tools are used for either straight or cherrying cuts, and such operations are performed without changes in set-up. Either the cutter can be moved through a circular path using the oscillating head set at any required diameter, or the entire head can be locked securely in position and the machine used for regular rectangular cutting.

One of the principal features of the machine is the oscillating head equipped with power feed using a separate motor, by means of which an ordinary die sinking cutter is moved through a semicircular path, producing a cylindrical cavity. In addition, it produces the correct draft on the die and eliminates cutting the draft by hand. Power feed facilitates operation and increases production speed.

The machine is heavily built and extremely rigid. Vibration is reduced to a minimum, providing smooth, accurate cutting. Of vertical design, the machine has a knee supported by an elevating screw and sliding on vertical ways on the front of the column. This knee carries the table, which travels in two directions, and the rotary vise mechanism. Micrometer rings and binders are provided on all slides, and a folding curtain protects the ways from chips and dirt. The handwheels and controls are in duplicate, on either side of the machine.

The general working dimensions include a maximum distance of 17½ in. from the working surface of the vise to the end of the spindle. The knee has a vertical travel of 16 in., and the spindle quill a travel of 2½ in. The distance from the column face to the center of the spindle is 21 in. The table has longitudinal and transverse travels of 12 in. each. The vise will take a block up to 9 x 10 inches.

The oscillating head, including the spindle driving motor, is balanced by a counterweight and can be moved by a handwheel in addition to the power feed. The head is mounted on two large eccentrics arranged with an adjustable throw so that the head can be revolved through a diameter ranging from 0 to 3½ in.

The oscillating head is powered by a ¼ h.p., 4-speed reversing motor operating through a two-speed gear box, which, together with a controller, provides eight feeds for any spindle speed. The entire reduction unit and change gears are enclosed and run in oil. The

head is a large casting containing the spindle quill and spindle at one end with the spindle driving motor mounted at the other. Drive to the spindle is by means of two sets of V-belts and pulleys with an idler belt tension adjustment. The motor is 1 h.p., 4-speed, which with the double belt drive provides eight spindle speeds from 300 to 3,600 r.p.m.

The spindle quill construction provides a vertical cutter movement of 2½ in., controlled by a small handwheel. The 2-in. steel spindle is solid, and is mounted in anti-friction bearings. By combining the feed and cutter movement, it is possible to sink a spherical cavity, and a cherrying cut can be sunk below the surface of the die. A quarter cylinder can be cut by feeding the cutter through an arc of 90 deg., and using the longitudinal feed. Inverted cylinders or spheres can be produced either above or below the surface of the die.

Gorton No. 8-D Universal Milling Machine

A universal milling machine with high speed spindle has been added to the line of high speed profiling, die-cutting, engraving, and milling machines made by the George Gorton Co., Racine, Wis. The new machine—to be known as the No. 8-D Universal—is a highly accurate machine with a fully universal head, especially designed for running small cutters at high speeds on tool, die, mold, and metal pattern work. It is the same size and has the same cutting capacity as the Gorton No. 8-D.

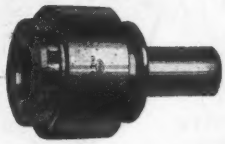
Both heads swivel 360 deg. in either direction. The heads are counterbalanced, and swing at a touch of the hand to any position, where they will remain without clamping. Large graduated swivel head dials permit accurate adjustment to the fraction of a degree. A simplified clamping arrangement provides for clamping both heads securely in a few seconds.

Tremendous range and flexibility are obtained by means of the sliding head, which carries the spindle and drive complete. Adjustment in and out is quickly made with a rack and pinion, making possible a cross feed equal to the longitudinal feed of the table. Spindle speeds up to 1,800 r.p.m. permit running small cutters and drills for work commonly performed with high speed attachments; at the same time, no sac-

H & G DIE HEADS

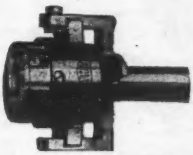
for all machines on which threads are cut

Famous for quality threads, low operating costs and year in and year out dependability.



STYLE EE—(Rotary). Designed for automatics, threading machines and bolt cutters, where the die head rotates.

STYLE C—Hand Closing Die Heads for hand turret machines.



STYLE D—Head for Brown & Sharpe Automatics and other small machines.

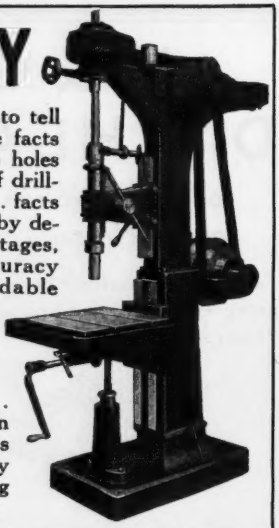
Special series of Data Sheets on Thread Cutting available to users of H & G Die Heads.

Write For Catalog

The Eastern Machine Screw Corp.

NEW HAVEN, CONN.

AVEY



has a story to tell . . . definite facts about more holes per dollar of drilling cost . . . facts backed up by design advantages, inbuilt accuracy and dependable service.

Now!

Do it now . . . get details on advantages offered by AveyDrilling Equipment.

The AVEY DRILLING MACHINE Co.

CINCINNATI -:- -:- -:- OHIO

PORTABLE VISE STAND--

A Real Convenience and Time Saver for Every Shop

Move the vise, tools and day's work to the machine. Eliminate those many extra steps.

This movable bench embodies a large base with ample weight. Rear wheels have brakes. With handle pulled forward, front wheel is operable and brakes are released from rear wheels.

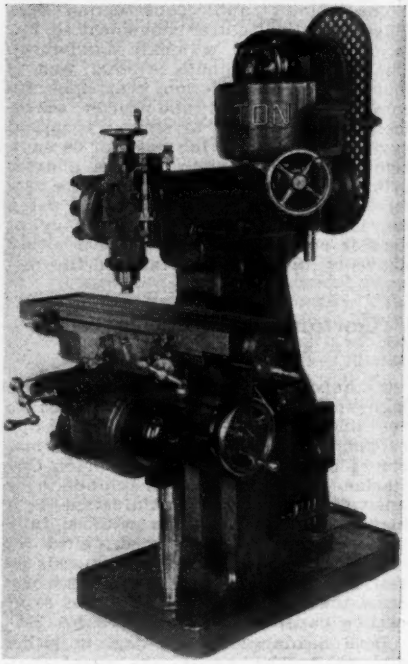
Write for Specifications and Prices.

THE WESTERN TOOL & MFG. CO.

SPRINGFIELD, OHIO

rifice has been made in power of drive or ruggedness of spindle and swivel heads. The machine will run a ½-in. high speed steel end mill to the limit, and is rigid under cut.

Power or hand feed to the table is optional. The motor and gear box for table feed are compactly assembled within the knee, and either power knee



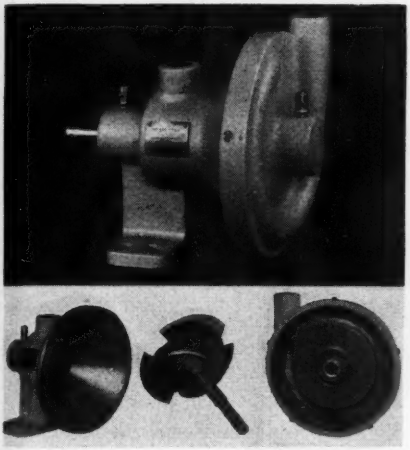
Gorton No. 8-D Universal Milling Machine.

can be furnished or plain knee substituted without affecting other parts of the machine.

The machine is simply and strongly built. Adjustments are provided for wear. Other refinements include antifriction bearings throughout, dust-proof bearing seals, heat treated gears, and dynamically balanced rotating units. The table longitudinal feed is 20 in. Table cross feed is 10 in. Sliding head movement, 10 in., adding 10 in. to table cross feed and enabling the machine to cover a 20 x 20-in. area at a setting. Vertical feed of knee, 13¾ in. Height overall, 71 in. Weight, 2,100 pounds.

Tomkins-Johnson "Spiral-Flo" Pump

A pump called the "Spiral-Flo" has been developed by the Tomkins-Johnson Company, Jackson, Michigan, designed to eliminate the necessity of closely fitting and closely machined parts within



Tomkins-Johnson "Spiral-Flo" Pump Assembled and Disassembled.

the pump chamber and at the same time to provide efficient operation. The pump is supplied with ½ in. intake and ¾ in. outlet to provide seven gallons per minute capacity at 1,000 r.p.m. and 14 gallons per minute capacity at 1,725 r.p.m., or with 1 in. intake and 1 in. outlet capable of 31 gallons per minute at 1,725 r.p.m.

Ball bearings provide quiet, free running action and are protected by standard oil seals. Alemite pressure lubrication fittings are provided throughout. Since there is no appreciable back pressure, no relief valve is necessary. No check valve is necessary. The pump needs priming only when first installed. The cap to which the discharge connection is attached may be rotated to any desired position on the housing. The Spiral-Flo pumps either water or oil, or any combination of the two, efficiently and is not affected by grit, chips or foreign matter which may enter it. It is

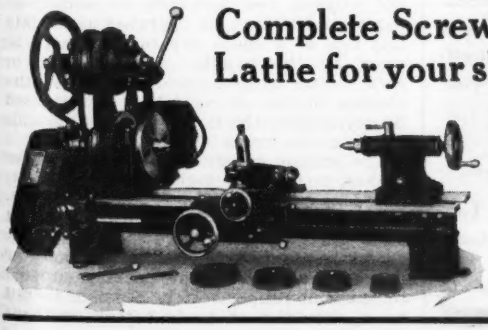
PERKINS GEARS

-- *for Accuracy*
insured by rigid adherence to highest standards.

-- *for Quality*
due to use of finest materials—heat treated and ground.

-- *for Dependability*
and economy as evidenced by the large number of users of Perkins Worms and Gears.

Perkins Machine & Gear Co.
151 Circuit Ave., SPRINGFIELD, MASS.



Complete Screw-Cutting Lathe for your shop, only $79.00 *less motor*

The real thing—no imitation, but a precision lathe, accurate to 1/1000". Big production makes this price possible. Six speeds. Cuts all screws from 4 to 32 per inch. Price includes change gears, compound rest, etc.—everything in picture except motor. 9" swing, 18" capacity. Satisfaction or money-back guarantee. Easy terms. Write for full details.

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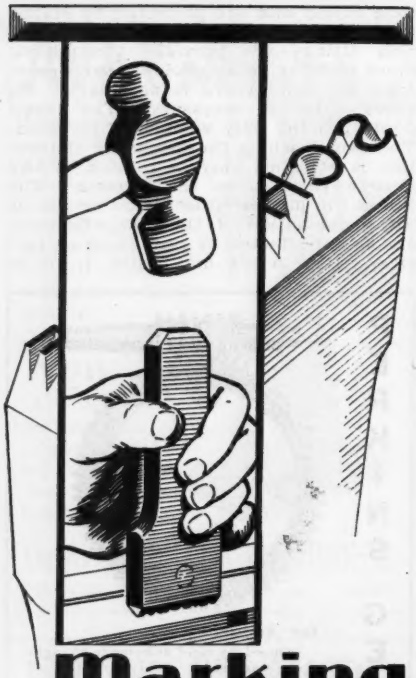


Marking dies

MECHANICALLY engraved steel stamps outwear the old-fashioned hand-made kind. We make: Hand stamps and stamps for use in machines, Roller dies, Embossing tools. Heat treatment by a well-manned, well-equipped department. Write for estimates on your steel stamp requirements.

"IT PAYS to Use GOOD Marking Tools"

The Schwerdtle Stamp Co.

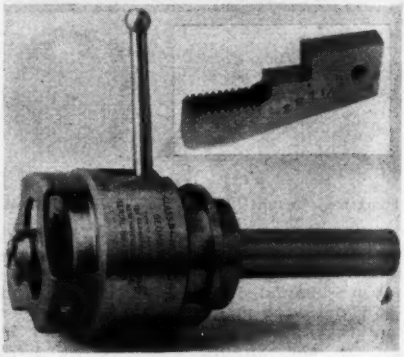
18 Cannon St. Bridgeport, Conn.

claimed that maintenance will be a big feature of the Spiral-Flo, due to its simple construction. There are no gears that will wear.

Geometric Class SL Collapsing Tap

The illustration shows a collapsing tap for small hole tapping, the feature of which is the rigidly supported chaser. This tool is a product of The Geometric Tool Company, New Haven, Conn. The chaser construction and front end operating mechanism of the tool differ from similar features of the Geometric Class "S" taps, but the smaller tool has many features in common with the standard line.

The tool has a wide range of adjustment, and the same tap, with separate chasers, of course, can be used for both



Geometric Class SL Collapsing Tap. (Insert) Close view of Chaser.

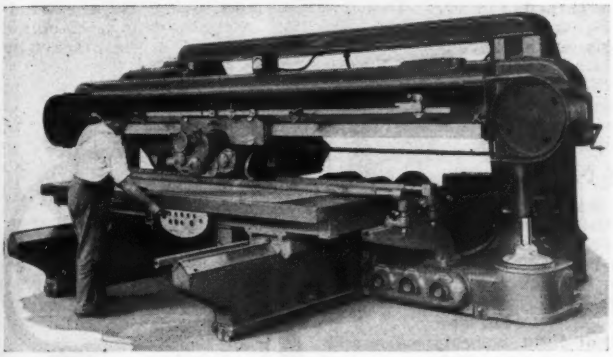
right and left hand tapping. It can be used in live spindles or stationary holders without the necessity of additional parts, and it may be operated as a plate trip tap or a spool trip tap. It may be reset by the handle or by a yoke or fork riding in the spool section of the closing sleeve. A lever trip can be used by contacting the handle with a suitable stop on the cross slide.

The unique construction of the chaser makes possible a rigid support its entire length, especially back of the cutting teeth, with supplementary support over the shoulder below the thread. There is plenty of metal in the body of the chaser, with a long bearing support in the tool proper. It is possible to tap to a shoulder or to a bottom without

the use of special or overhanging chasers. All parts are made from special alloy steel, hardened and ground.

Mattison Abrasive-Belt Surface Grinder and Polisher

The illustration shows the No. 405 Abrasive-Belt Surface Grinder and Polisher, which has been developed by the



Mattison No. 405 Abrasive-Belt Surface Grinder and Polisher

Mattison Machine Works, Rockford, Ill. The machine is especially adapted for polishing stainless steel sheets. The sheets are placed on a carriage which rides on tracks on a heavy cross-rail that is mounted on the columns. The polishing action is obtained by means of flexible abrasive belts which are more than 40 ft. long; thus time is allowed for cooling of the individual grains between cuts. The belts have a uniform, even surface which assures maximum cutting efficiency.

The main driving motor is mounted in the carriage head and drives the contact roll, which, in turn, drives the belt. The large idlers at each end of the machine are provided with adjustments for aligning and tensioning the belts. The belt, passing over the small rubber-covered idler rolls, is thus flexed around the contact roll not only for the purpose of increasing driving power, but also so that particles lodged between the grains will be dislodged.

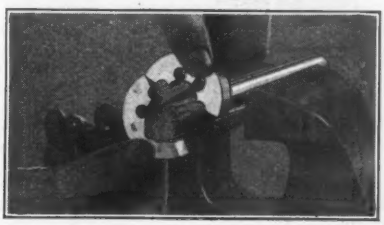
The grinding head is mounted on ball-bearing rolls and reciprocates from end to end of the sheet being worked. It is driven by an individual motor mounted in the left end of the main cross-rail. Stops are provided to govern the reverse. The table is a massive hollow casting and is water-cooled through inside circulation of water. It is mounted on ball-bearing rollers on heavy V-tracks, steel-faced. Power to move the table is supplied by the reversible motor at the rear of the machine.

The sheet is held firmly in position by two spring-loaded, cushioned, hold-down rolls at either side of the belt. The main cross-rail is adjustable on the columns and an indicator permits of setting to thousandths of an inch. The cut is regulated by a fine adjusting screw located in the carriage head.

In operation, the carriage reciprocates and the table moves slowly cross-wise, bringing the entire surface of the sheet under the roll. Whatever heat is generated is rapidly carried off by the water-cooling arrangement to the table. Stock is removed in the form of fine steel wool, indicating a clean cut. By removing the belt and contact roll, Tampico brushes, buffing wheels, or other forms of polishing wheels can be used.

Greenfield "Slip-On" Re-Threading Die Set

A line of "Slip-On" re-threading dies with GTD ratchet stocks, for use in repairing damaged screw threads, has been placed on the market by the Greenfield



Greenfield "Slip-On" Re-Threading Die in use.

Tap & Die Corporation, Greenfield, Mass. The die resembles an ordinary round die that has been cut into halves,

the two pieces of which are held together by a flat spring on the side of the die. To use, it is necessary only to pull the halves apart, slip the die over the clean, unbruised portion of the thread, drop the special ratchet stock over the die, tighten the screws, and back it off over the battered or torn threads. Inasmuch as threads are usually damaged near or at the end, this procedure obtains in most cases.

"Slip-On" dies are made in NC (U. S. S.) and NF (S. A. E.) threads, in all sizes from ¼ in. to 1⅛ in. inclusive. They are available singly or in convenient assortments. Each set includes a GTD ratchet socket which can also be used to hold any round die of 2 in. diameter.

Jarvis Screw and Nut Setter

The problem of the driving of small screws and nuts on production work has been solved by the development of the "Jarvis Setter," which has been placed on the market by The Charles L. Jarvis Co., Gildersleeve, Conn. The tool is of light weight, yet amply powerful, and provides a uniform, adjustable tension. The construction includes the well-known "Niedhammer" - type clutch.

Jarvis Screw and Nut Setter

The screw or nut-setting tool is applied by means of a hand piece on the end of a flexible shaft that is driven by motor. The motor is suspended overhead, as shown, so that neither motor nor shaft will interfere with the work. The motor is ¼ h.p., ball bearing equipped, 1,750 r.p.m., constant speed. The flexible shaft has a ⅜-in. Biax core, 36 in. long, encased in an interlocked type metallic casing with flat steel inner lining. The casing is oil proof and is equipped with protection springs. It is connected to the motor by swivel.

The hand piece is double ball bearing, and the clutch is of the mechanical, double ball type, easily adjusted to any required tension. The clutch is said to maintain a set tension indefinitely, providing for uniformly-tightened screws. Screws, nuts, or bolts up to and including ¼-in. diameter can be set with this tool. Variations of this tool in geared-down units are available.

"Multi-Jarvis" Bench Model Flexible Shaft Machine

The illustration shows the Type FJA Bench Model Multi-Speed Filing, Grinding, Sanding, and Polishing Machine, which has been placed on the market by

"Multi-Jarvis" Type FJA Bench Model Flexible Shaft Machine

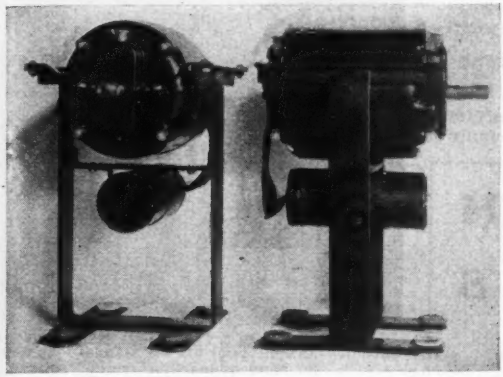
The Charles L. Jarvis Co., Gildersleeve, Conn. The flexible shaft is a ⅜-in. Biax, 42 in. long, encased in a rubber vulcanized elastic steel casing, and connected through a swivel. Shafts of 60 in. or longer are available.

The shaft is powered by a ⅓ h.p. ball bearing, 40-degree, repulsion induction motor, driving through a ball bearing, self-tightening countershaft. A moulded V-type belt is used, which can be changed by means of a lever to vary the speeds. Four speeds are available: 1,000, 2,000, 3,000, and 4,000 r.p.m.

A Type KGZ hand piece is used, this hand piece being ball bearing with an internal precision collet. The unit can be supplied in connection with a roller floor stand carrying a tray for tools, for use in shops where it is necessary to change location frequently. It can also be supplied for use with an overhead trolley, the trolley consisting of a 1⅝ x ⅜-in. Monorail.

Absence of Noise Features "Ohio" Motor

The success of the merchandising of air conditioning equipment depends to a large extent upon the feature of quiet operation. To meet the demand for noiseless operation, The Ohio Electric Mfg. Co., 5940 Maurice Ave., Cleveland, Ohio, has developed a motor that is said to be practically noiseless in operation.



Capacitator start and run is used with motor to avoid noise in air conditioning equipment and to increase efficiency.

The manufacturer states that in order to obtain noiseless operation of an electric motor, the design and construction of the motor must include the following features: (1) ample magnetic cross section; (2) extreme accuracy of machine work with fits to close tolerances; (3) rigid cast iron frame; (4) rotor ground to exact air gap dimensions and perfectly balanced; (5) bearings reamed, diamond-point bored at high speed and burnished to exact size and mirror-like finish, with accurately-ground shafts; (6) lubricating system providing for recirculation and filtration of oil; (7) prevention of end slap; (8) proper selection of rotor and stator slot combination, correct squirrel cage resistance, and correct rotor twist. The above features are claimed for the motor illustrated.

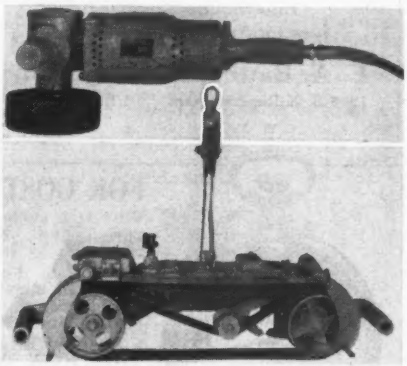
The motor shown in the illustration is wound to operate at 840 r.p.m. It is provided with capacitator start and run, to avoid the use of a starting switch which might make a little noise at starting or stopping. Similar motors can be wound to operate at several speeds from 500 to 1,750 r.p.m., although noise is practically unavoidable at speeds above 1,000 r.p.m.

Buckeye Develops Line of High Frequency Portable Tools

The Buckeye Portable Tool Co., Dayton, Ohio, is broadening its line of "Hercules" portable tools by the introduction of several tools in the construction of which a specially-designed high frequency motor is used.

The high frequency belt sander shown in the illustration features a single motor drive. Finding it impossible to synchronize two electric motors, the "Hercules" engineers designed the tool to operate with one motor. This tool is used in smoothing down welds, sanding or polishing sheet metal, smoothing up large dies, and for similar work. It is suspended over the work by means of a cable, where it is operated by a single operator.

An interesting feature of the sander is that it is cooled by compressed air, the air acting to prevent dust or grit from getting into the motor. Compressed air is also used to obtain automatic belt tension. The belts are 2¾ x 5½ in. By the use of a belt idler it is possible to use manufactured abrasive belts over an endless leather



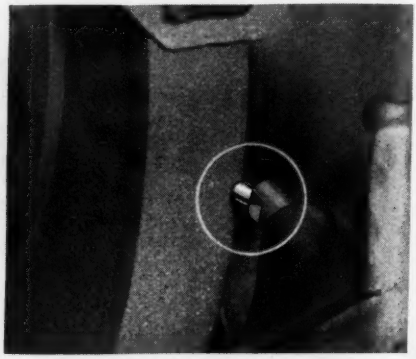
(Above) Hercules High Frequency Cup Wheel Grinder. (Below) Hercules High Frequency Belt Sander.

belt, although canvas-coated belts can be used with the addition of guide rolls. The speed is 4,500 r.p.m.

The high frequency motor is also used in the construction of the Hercules Cup Wheel Grinder shown above in the illustration. This tool is used for surfacing large castings and for grinding dies.

Carboloy Introduces Diamond-Impregnated Tool For Dressing Grinding Wheels

Announcement of a new type of truing tool for finish dressing grinding wheels has been made by Carboloy Co., Inc., 2485 East Grand Blvd., Detroit, Michigan. The new truing tool consists of a matrix impregnated with small crushed diamonds which are distributed uniformly throughout the matrix, providing an ample number of cutting points at each new surface reached during the life of the tool.



Carboloy Truing Tool fits all standard holders for hand or machine truing.

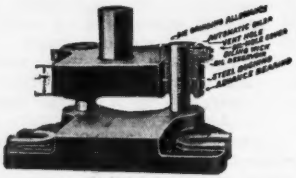
Chief among the advantages said to be found in this truing tool are: (1) low initial investment cost; (2) requires no further setting or mounting; (3) may be used economically on same grinder and same size wheel throughout its entire life; (4) requires no special adaptors, and has no moving parts to adjust, repair or replace; (5) is small, compact, and fits into any standard holder for hand or machine grinding.

The range of wheel sizes and types on which the Carboloy Truing Tool has been successfully used covers sizes up to 36 in. diameter by 2 in. wide and "M" in hardness. On centerless grinding

BAUMBACH

Automatically Oiled

DIE SETS



Standardized die sets, embodying many exclusive features, and a listing of 70,000 stock sizes afford a service that is unsurpassed.

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1806 S. Kilbourne Ave. Chicago, Ill.

FOR COST AND PRODUCTION ANALYSIS

Eliminate guess work and "blind" figuring in production and cost finding. Know your production figures. Analyze operations step by step to stop waste and speed production.

This Aristo No. 1 Timer registers seconds and fifths up to sixty, and minutes up to thirty. Quick acting, accurate and of exceptional workmanship, this model has been the most popular for time study work.

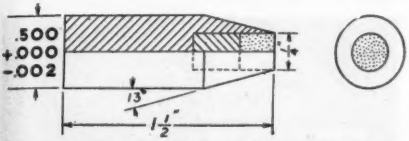
COMPREHENSIVE, UNBIASED INSTRUCTION BULLETIN, "HOW TO MAKE TIME AND MOTION STUDIES," SENT FREE UPON REQUEST. ASK FOR PARTICULARS ON OTHER TYPES OF TIMERS.

We Repair All Makes of Stop Watches

ARISTO IMPORT CO., 14 John St., New York, N. Y.

wheels, sizes up to 20 in. diameter by 6 in. wide can also be finish-dressed economically.

During the time which has elapsed since their commercial introduction,



Cross section of Carboloy Truing Tool inserted in typical holder. Dotted section indicates diamond-impregnated, tungsten carbide matrix.

these truing tools have been used with satisfactory results on wheels for the grinding of crankshafts, camshafts, pistons, piston pins, tappets, armature shafts, automotive and aeronautical valves and many other types of hardened miscellaneous parts.

Louis Allis Splash-Proof Motor

An electric motor that is so constructed as to prevent the entrance of water splashed with terrific pressure from any angle, yet adequately venti-

WE ARE TURNING THE CORNER

It's time to check equipment and get ready to snare your share of the business. If you expect to do any accurate boring jobs you should have the latest information about the

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Precision Borer

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Investment Bldg. Washington, D. C.

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Uniformly Super-Strong, Speedy, Clean-Cutting Teeth That Quickly Bite Through Toughest Metal.

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That's why we guarantee Lenox blades to equal or better any blade on the market today, on any job, any time, any place. Lenox blades are sold on performance and uniformity — not on price. Standardize on "The Blade in the Plaid Box." Your dealer has them.

LENOX

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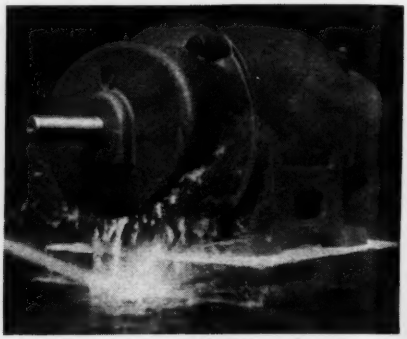
AMERICAN SAW & MFG. CO.
Springfield, Mass., U. S. A.

"The Blade in the Plaid Box"

lated and built in the same dimensions as standard open motors, has been developed by The Louis Allis Co., 425 East Stewart St., Milwaukee, Wis. The protection against splashed water is obtained through a double baffle in an elliptical-shaped air passage in each endbell. This unique construction, while permitting free passage of ventilating air, traps and drains water splashed into the air openings at the bottom of the elliptical-shaped chambers. Another feature is a shaft guard which breaks the force of a stream directed along the shaft extension and prevents water from entering the bearing chamber.

The illustration shows one of eight practical tests in which the motor, operating at 1,800 r.p.m., was subjected to direct streams and water splashed from various angles. An inspection immediately after showed the winding and inside of the motor to be perfectly dry.



Louis Allis Splash-Proof Motor in process of testing.

Type YAK Barcol Midget Motor

To supply the demand for a shaded-pole electric motor to run at a slower speed than existing models with no sacrifice of starting torque or efficiency, Barber-Colman Company, Rockford, Ill., has announced the Type YAK Barcol Midget Motor. This is a core-type motor of the same general design as the others

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FOOL-PROOF!

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Because of their simple, compact and durable construction GUSHER COOLANT PUMPS are absolutely fool-proof.

Over 60 manufacturers of the finest machine tools have adopted them as standard equipment. They *must* be good!

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SPEED SPOT WELDERS

½ to 75 K. V. A.

OVER 20,000 IN USE

Made foot-operated and automatic motor drive. For welding from .0005" to ⅜" combined thickness.

Welders for fine work priced as low as..... $55.00 SUBMIT YOUR PROBLEMS

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Distributor and Dealer Connections Desired

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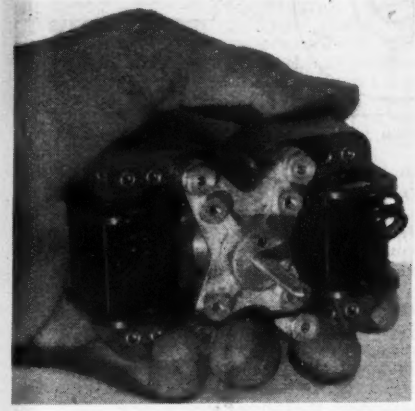
which have preceded it except that it has four poles and therefore runs at approximately half the speed of its predecessors. The reduction in speed has entailed no reduction in starting torque or efficiency. It is suitable for driving a variety of mechanisms such as pumps or fans for cooling, exhaust, or heating, as it will pull a fairly large blade without producing the objectionable noise due to high tip speed.

With the four-pole construction of this motor the "synchronous" speed is 1800 r.p.m. as compared with the 3600 r.p.m. of the smaller models. Actually the no-load speed is about 1700 r.p.m., due to



Type YAK Barcol Midget Motor

the necessary slip between the rotor and the rotating field. At full load the motor delivers 0.0035 h.p. at 1300 r.p.m. with an input of 23 watts at 115 volts 60 cycles. The starting torque is two-tenths of a pound-inch, which is considered very good for a shaded-pole motor.

The general type of construction of the Four-Pole Barcol Midget Motor is much the same as preceding models, except that it is larger and has somewhat the appearance of two two-pole motors combined on a single rotor which, in effect, it is. Its outside dimensions are 3" x 2¼" x 1" and the shaft is located in the center of the two largest dimensions. Two field coils are used, wound on phenolic resin spools and connected in series. There are two shading rings on each of the four poles. The motor is durably built throughout for long and dependable operation and can be made to suit a variety of voltage and

NOW—YOU CAN MAKE YOUR OWN CARBOLOY TOOLS AT A LARGE SAVING IN COST!

$28.50

—covers complete materials including Carboloy tips and recessed shanks (for right or left hand use) for making 4 Carboloy tools. You just torch-braze, grind, and the lowest-priced Carboloy tools it is possible to buy are ready for use.

With this new $28.50 Carboloy Tool Manufacturing Kit you can make—in your own plant—4 Carboloy tools sizes ⅜" square to ⅝ x 1¼, either right or left hand—actually a choice of 8 general purpose tools with a total finished value of over $80.00. It's the easiest, lowest-priced method yet offered to make a large saving on single-tipped Carboloy tools, and the most convenient way to stock Carboloy tools for regular and rush jobs at a low investment cost.

Write for full details and start reducing cemented carbide tool costs at once.

Send for full details on this lowest-priced method of buying CARBOLOY TOOLS

CARBOLOY CO., INC.
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Chicago Cleveland
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Carboloy Company, Inc.
2485 E. Grand Blvd., Detroit, Mich.
Send us FREE booklet showing how we can save by making our own Carboloy tools.

Name_____

Company_____

City_____ State_____

frequency requirements. Barber-Colman Company has patents allowed and pending on this type of electric motor.

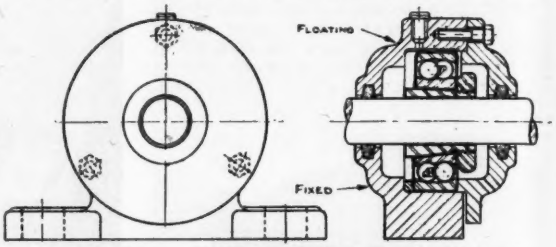
User Can Now Make Carboloy Tools

Users of Carboloy tools can now make their own tools, with the aid of a tool manufacturing kit that is being offered by the Carboloy Co., Inc., 2485 East Grand Blvd., Detroit, Mich. The kit contains a complete outfit of materials, including Carboloy tips and four shanks for either right or left hand use. The user torch-brazes the tips to the tools in any of eight different forms, and grinds the tools to the shape desired.

This system will make it possible for the user of Carboloy tools to stock tips and shanks with a minimum investment and place him in position to make up Carboloy tools as required for regular or rush jobs.

Norma-Hoffmann Announces Ball Bearing Pedestal

A line of unit pedestals for pillow blocks has been announced by the Norma - Hoffmann Bearings Corporation, Stamford, Conn. The line is designated as the "LUP" Series, and is adapted to all average industrial requirements, in sizes to fit standard shafting in nominal



Norma-Hoffmann "LUP" Series Ball Bearing Pedestal

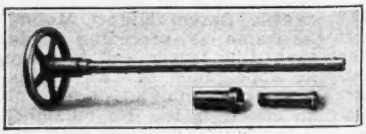
inch as well as sixteenth-inch diameters, from $\frac{1}{8}$ in. to $3\frac{1}{2}$ inches.

The ball bearings are the standard Norma-Hoffmann "Precision" double-row self-aligning type with adapter sleeve. The pedestals have capacity for a large volume of lubricant, with fittings for replenishing as needed. Protecting felt seals prevent escape of lubricant along the shaft. The pedestals may be had with the bearings either floating or fixed in the housing. In the latter case, suitable distance pieces are furnished for clamping the other ring.

Lunkenheimer Bottle Oiler

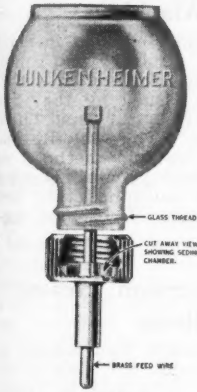
A "bottle" oiler in a new design, shown in the illustration, is now being marketed by The Lunkenheimer Co., Cincinnati, Ohio. Some advantages

Grind Fast!
with the
New Hand-ee Grinder
10,000 r.p.m. on 110 v. A.C.
$10
Postpaid
Use where you have to touch off a part, pattern, mould, tool or die, or to grind little holes, open or blind, straight or formed. Handy for sharpening tools or dies in place. Take it to the job. Works on A.C. or D.C. Just plug in and grind. Fits the hand. Weighs 1 lb. Order direct or from your supplier. Money back if not satisfactory in five days' trial. Three wheel shapes free. Order today.
M. C. TOOL CO., 110 S. Aberdeen St., Chicago
100 SHAPES AVAILABLE



Collet Attachments for your lathes and millers
Write for Bulletin No. 100 A. M. — Rivett Draw-In Collets and Chucks. Also Price List and Dimension Sheet.
Rivett Lathe & Grinder Corp.
Brighton Dist., Boston, Mass., U. S. A.

claimed for the bottle oiler are ease of application, convenience of refilling or replacing, and cleanliness. This type of oiler supplies the correct amount of oil for efficient and economical lubrication of plain bearings. It is automatic in operation, feeding only when the shaft is in motion.



Lunkenheimer Bottle Oiler

The oiler comprises three major parts; a glass bottle with threaded neck, bronze base with integral sleeve-type shank, and brass feed wire. A thick, resilient cork washer seals the joint between the bottle and the base. The feeding of the oil down the feed wire involves two principles: (1) what might be called "thermal breathing"—a periodic expansion and contraction of the air within the bottle due to changes of temperature, and (2) "capillary creep," aided by the agitation of the feed wire when the shaft is in motion. The feed of the oil is slow but dependable, and the supply is always visible. Booklet No. 532, issued by this company, gives complete details.

Booklet For Welders

Numerous applications of inorganic flux-coated welding electrodes are described in a new booklet just published by the Metal & Thermit Corporation, 120 Broadway, New York, N. Y., which earlier this year introduced Murex Heavy Mineral Coated Electrodes.

The new booklet describes the welding of mild steel and boiler plate, stainless steel alloys, manganese steel, high carbon steel and stainless iron. The building up of railway rail ends, special manganese track work as well as the repair of castings and heavy parts is also covered.

A copy of the booklet may be obtained by writing the Metal & Thermit Corporation at the above address.

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With the New
TANNEWITZ MITER SAW
is instantaneous, clean cutting and accurate. Used on metal moulding, tubing, bar stock. Made in two sizes.
Write for details
The TANNEWITZ WORKS
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STAMPINGS
Small & medium stampings in a complete range of materials & finishes for general & special use. A 17-year old die department, specialized to produce accurate tools for your stamping requirements.

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Complete dies for making accurate, flat & concentric cut washers of *any material or thickness*. Also gang dies & round dies. Send for new die list.

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Save time & money by having a small stock of our arbor spacers. 1000 sizes & styles; from .001" to .125"; for 20 different arbor sizes. List sent upon request.

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Speed Reducers, Lathe, Shaper and Milling Machine Drives.
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1336 ALTGELD STREET CHICAGO

"Horse Head Zinc for Die Castings"

is the title of a booklet that contains a considerable amount of practical information for the user of die castings. The text contains information on the use of inserts, on soldering and welding of die castings, finishes and their applications, and points that should be covered in asking for estimates on die casting. The book contains a number of illustrations of die-cast parts, and gives the results of laboratory tests on die-cast metals. A copy of the booklet can be had by addressing The New Jersey Zinc Company, 160 Front Street, New York, N. Y.

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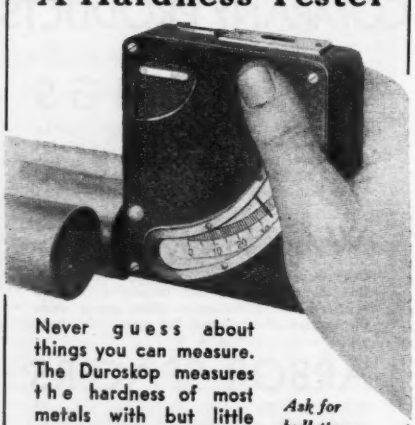

Never guess about things you can measure. The Duroskop measures the hardness of most metals with but little preliminary fuss. Readings can be made in two seconds.
Ask for bulletin No. H-4
THE R. Y. FERNER CO.
Investment Bldg. Washington, D. C.

Bulletin on "Cimatool" Diamond Boring Machines

The newest and most efficient method of obtaining perfect accuracy and finish —diamond boring—is discussed in a bulletin that has been issued by the City Machine & Tool Works, 1521 East Third Street, Dayton, Ohio. The bulletin also describes the features and methods of operation of three new types of diamond and carbide boring machines that are being built by this firm. Copies free upon request.

SteCom Immersion Heater Bulletin

Executives of plants and shops in which hot-solution tanks are used in the cleaning of metal parts will be interested in Bulletin No. 21, which has been issued by the Steam and Combustion Company, 1561 Sheffield Avenue, Chicago, Ill. The bulletin describes and illustrates the gas-fired immersion heaters made by this firm. Cross section diagrams illustrate the various types of units, and the text includes general dimensions and other data, with list prices. Copy free upon request.

Bronze Welding Rod Booklet

"Oxweld No. 25 M Bronze Patented Welding Rod," 20 pages, 3½ x 6 in. Published by The Linde Air Products Co., 205 East 42nd Street, New York, N. Y.

In this booklet are described the physical and welding characteristics of this new bronze welding rod, with which it is possible to obtain tensile strengths in

The Mummert-Dixon Spot Facer

. . . enables you to machine accurate and smooth surfaces on small bosses, etc., in less time than by any other method. Better investigate! Send for a bulletin.
MUMMERT-DIXON CO. 120 Philadelphia St. HANOVER, PA.

joining steel of between 56,000 and 60,000 lb. per sq. in. and ductility in excess of 30 per cent. Marked decrease in fuming and excellent weldability are other outstanding characteristics. Many important applications are described in joining metals and building-up wearing surfaces. Of special note are recommendations on a new technique for bronze-welding and for the fusion welding of brasses and bronzes; in particular, the proper flame adjustments are described for the various base metals.

Third Edition "The Straight Line to Metal Working Efficiency"

Users of cutting tools and grinding wheels will be interested in the third edition of "The Straight Line to Metal Working Efficiency," which is now being issued by D. A. Stuart & Co., 2737 South Troy Street, Chicago, Ill. The booklet contains 70 pages of data and information on lubricants and cutting oils, including a clear exposition of the action of the lubricant in reducing friction, improving the finish, and aiding the action of the cutting tool or grinding wheel.

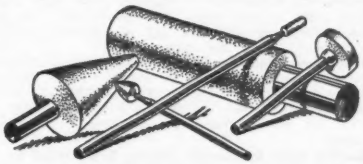
Practically every question that may arise in the mind of the purchaser of cutting oils is answered, and a fund of useful information for the user of the oils is included. Copies free upon request.

Clark Catalog of Bolts, Nuts, and Screws

Clark Brothers Bolt Co., Milldale, Conn., has issued a catalog listing the bolts, nuts, and screws made by this firm. The catalog is very complete and the items are conveniently arranged and indexed. In addition to the lists of bolts, nuts, screws, and so on, the text includes data regarding the dimensions of heads and threads, weights of materials, and other data, with several pages of illustrations. Copy free upon request.

"Delta" Drill Press Speed is 12,000 R.P.M.

In the advertisement of the "Delta" drill press on the third cover page of the October issue of MODERN MACHINE SHOP, it was stated that the press is built for speeds up to 1,200 r.p.m. This figure should have been 12,000 r.p.m.



OUR NEW CATALOG

"Grinding Wheels on Shanks"

is now ready. Shows wheels to fit any machine; wheels for anything from steel to stone, from glass to brass—complete assortment of shapes, sizes and kinds.

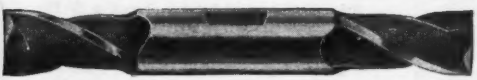
Gives latest information on grinding wheels useful at 1,000 or 100,000 r. p. m., for getting into places hard to get at, for touching off, for grinding out holes either open or blind. Write today for this new catalog. No obligation.

CHICAGO WHEEL & MFG. CO.
110 S. ABERDEEN ST. CHICAGO, ILL.

WEL-DON DOUBLE-END MILLS

A Great Team For Fast, Clean Work.

Stocks in Principal Cities



HIGHEST SPEEDS—FASTEST FEEDS—Hollow-Ground Flutes. Double Back-off Lips.

Write for Further Information

The WELDON TOOL CO., 1426 W. 3rd St., Cleveland, Ohio

For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

Chucks—Key and Keyless: Bulletin No. 120A, issued by T. R. Almond Mfg. Co., Ashburnham, Mass., describes and illustrates the line of key and keyless geared nut and ball bearing drill chucks made by this firm. Copy free upon request.

Cut Your Sawing Costs: "Lenox" hack saw blades and band saws are guaranteed to effect savings on your sawing operations. Write for information to American Saw & Mfg. Co., Springfield, Mass.

Ames Gages: Catalog No. 50, issued by the B. C. Ames Company, Waltham, Mass., contains complete descriptions and illustrations of the dial gages, gage heads, upright gages, cylinder gages, dial micrometers, and precision verifiers, special gages and attachments made by this company. Copy free upon request.

Time Study Watches: A folder containing illustrations and descriptions of the split-second watches, decimal watches, and other timing watches marketed by Aristo Import Company, Inc., 12 John Street, New York, N. Y., can be had by addressing a request to the firm as above.

Machine Shop Accessories: Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

"Atlas" Bench Lathe: A 9-in., screw cutting, self-contained, motor-driven bench lathe is now being built by Atlas Press Co., Kalamazoo, Mich. Write for circular.

Hold Odd-Shaped Pieces Securely: A vise in which odd-shaped work can be held securely without the need of special jaws or fixtures is described in a folder that has been issued by The Avey Drilling Machine Co., P. O. Box 487, Cincinnati, Ohio. Copy free upon request.

Greenerd Arbor Presses: Catalog No. 36, issued by the Edwin E. Bartlett Co., Nashua, N. H., describes and illustrates all the various types and sizes of arbor presses made by this firm. Copy free upon request.

Drop Forged Steel Die Sets: The economy and other advantages of drop forged steel die sets, which are now being made by E. A. Baumbach Manfg. Co., 1806 South Kilbourn Avenue, Chicago, Ill., are explained in a folder that can be had by addressing this firm.

Carboloy Tools: Handbook M32, issued by Carboloy Company, Inc., 2485 East Grand Boulevard, Detroit, Mich., describes the tools made by this firm, and also includes information regarding manufacturing, brazing, and grinding Carboloy tools. Copies free to mechanical executives.

Abrasives: Samples of "Aloxite" Brand "TP" Polishing Grains for trial may be had without charge by addressing the Carborundum Co., Aloxite Division, Niagara Falls, N. Y.

Gears Of All Kinds are described and illustrated, with specifications, in Catalog 80, which has been issued by the Chicago Gear Works, 105-9 S. Jefferson St., Chicago, Ill.

Mounted Grinding Wheels for use in small holes such as are found in bushings, dies, gears, tools, etc., are described in a catalog that has been issued by the Chicago Wheel & Manfg. Co., 110 S. Aberdeen St., Chicago, Ill. Copy free upon request.

Diamond Boring: The newest methods of diamond boring all kinds of bearings, gears, motor frames, small bushings, and other similar work are outlined in a bulletin that also describes and illustrates three new diamond boring machines. A copy can be had by addressing the City Machine & Tool Works, 1521 East Third Street, Dayton, Ohio.

Motorize Your Cone Pulley Lathes: An attachment that can be applied to your lathe with four bolts makes it possible to motorize and modernize your lathes. Write for information to Cullman Wheel Co., 1336 Altgeld St., Chicago, Ill.

Die Makers' Supplies: A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

Steel Spacing Washers: Milling jobs can be set up quicker by using standard spacing washers, made by Detroit Stamping Co., 3445 West Fort Street, Detroit, Michigan. Write for information.

H & G Self-Opening Die Heads for all types of machines in which threading is done are described and illustrated in a catalog that has been issued by The Eastern Machine Screw Corporation, 140-150 Truman St., New Haven, Conn. The booklet also shows the H & G Threading Machines and Chaser Grinders. Copy free upon request.

"Speed" Spot Welders for welding metals from 0.0005 in. to 5/8 in. thick are described in a catalog that can be had by addressing Eisler Electric Corp., 761 South 13th Street, Newark, N. J.

The Red Liner is an automatic machine that inspects gears under conditions similar to those of actual operation, and charts errors on a 200-to-1 scale. Write Fellows Gear Shaper Company, Springfield, Vt., for booklet.

Performance Data On Swiss Jig Borers: This 36-page pamphlet shows various types of jobs from a power shovel turntable jig to a television disc, drilled and bored on Societe Genevoise High Speed Precision Borers, giving data as to size of holes, accuracy and time savings. Free upon request to The R. Y. Ferner Co., 1008 K Street, N. W., Washington, D. C.

Formica Silent Composition Gears: A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

Stampings of any kind or size can be obtained from Gerding Brothers, 5 East Third Street, Cincinnati, Ohio. Write for particulars.

High Speed Profilers for difficult and unusual production jobs on which small cutters and high speeds are used are described in a booklet which also shows samples or work and set-ups. Write to George Gorton Machine Co., Racine, Wis.

Ball and Roller Bearings, either journal or thrust, for all purposes and in all sizes, are described and illustrated in catalog No. 9 which has been issued by The Gwilliam Company, 360 Furman Street, Brooklyn, N. Y. Copy free upon request.

Precision Bench Lathe Work can only be done on finely-built, accurate machines. The complete line of Hjorth Precision Bench Lathes is described and illustrated in a catalog that has been issued by Hjorth Lathe & Tool Company, 60 State Street, Boston, Mass. Copy free upon request.

Oil and Waterproof Chucks: The J & H Electric Co., 202 Richmond Street, Providence, R. I., is now making a chuck that is oil and waterproof, and is designed to provide a maximum of holding surface with exceptionally strong and uniform pull throughout. Ask for complete information.

Threading Machinery: Complete catalogs of individual bulletins covering the pipe threading and cutting ma-

chines, bolt threading machines, or die heads made by Landis Machine Co., Waynesboro, Penna., may be had upon request from this firm. State size and type of machine or die head concerning which information is required.

Air-Operated Work-Holding Devices: A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

Master Complete Power Drive: Booklet S210, issued by The Master Electric Company, 104 Davis Ave., Dayton, Ohio, describes and illustrates the Master Geared-Head Motor in service, with applications to all kinds of drives. Copy gratis.

"Hand-ee" Grinder: A grinder for use on dies, tools, and other fine work, made to fit the hand, weighing one pound, with plug to operate from light socket, is described in a folder that can be had by addressing the M. C. Tool Co., 120 South Aberdeen St., Chicago, Ill.

Compound Spot-Facing Tool: A spot-facing tool retracting, serrated roughing cutters and fixed finishing cutters in the same tool will break up the scale easily and do accurate work. Write for bulletin to Mummert-Dixon Co., 120 Philadelphia St., Hanover, Penna.

Ball and Roller Bearing Data Sheets: A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

"Commercial Lapping for Close Limits and High Production" is the title of a booklet that discusses hand and machine lapping, types of lapping tools and machines, workholders for machines, preparation of laps, preparation of work for lapping and other important points. A copy may be had by addressing Norton Company, Worcester, Mass.

Die Making Machines: How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

Good Gears of all kinds—spur, spiral, bevel, worm, hypoid—in fact any kind or type of gear desired, large or small, machined to an excellent finish and the highest degree of accuracy, may be obtained from Perkins Machine & Gear Co., 151 Circuit Ave., Springfield, Mass. Write for estimates.

Bench Lathe Mounting and Driving Equipment: Bulletin 120-A, issued by Rivett Lathe and Grinder Corporation, Brighton, Mass., contains complete descriptions and illustrations of modern and conventional countershaft, individual motor drive jackshaft, and speed box motor drive, also benches, cabinets, oil pans, etc. Copy free upon request.

Automatic Lubrication: Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

Steel Stamps and Marking Dies: Full information as to steel stamps, steel roller dies, embossing dies, and embossing rolls made by the Schwerdtle Stamp Co., 10 Cannon Street, Bridgeport, Conn., can be had by writing this firm.

Hardening Simple Tools and Parts: Instructions as to the hardening and tempering of small high speed and carbon steel tools and sections can be had, together with a circular describing the "Electroblast" High Speed Muffle Furnace, by addressing a request to Stark Tool Company, Waltham, Mass.

Cutting and Grinding Facts: A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, 1608 Walnut Street, Philadelphia, Penna. Free upon request.

The Advantages of Abrasive Cutting by the use of a new type of miter saw as applied to the cutting of bar stock, tubing, metal moulding and so on are told in a bulletin that can be had by addressing The Tannewitz Works, Grand Rapids, Michigan.

Electrically-Driven Portable Tools: The "U. S." line of electric drills, die grinders, surface grinders, toolpost grinders, and bench and floor grinders is described in Catalog No. 33, published by The United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio. Copy free.

Double-Life End Mills: Weldon Double-End Type End Mills, made with blades on each end, are described in Catalog No. 6, issued by The Weldon Tool Company, 1426 West Third Street, Cleveland, Ohio. Other small tools made by this firm are also described and illustrated in this catalog.

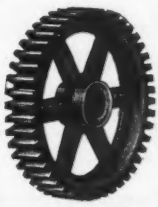
Shop Furniture: A catalog describing and illustrating all kinds of shop furniture, including benches, vises, steel stands, foremen's desks, chip trucks, steel racks for bar stock, steel tote boxes, and other equipment will be sent free upon application to The Western Tool & Manufacturing Co., 1620 East Pleasant Street, Springfield, Ohio.

National Machine Tool Builders Move Offices

The offices of the National Machine Tool Builders' Association have been moved from the former location at 1415 Enquirer Building, Cincinnati, Ohio, to 1220 Guarantee Title Building, Cleveland, Ohio. Herman H. Lind is General Manager.

"A Prest-O-Lite Torch for Every Requirement"

A folder by the above title, listing, describing, and illustrating the various types and kinds of soldering and welding torches made by The Linde Air Products Co., 32 East 42nd Street, New York, N. Y., can be had by addressing the firm mentioned. Included among the items are torches for ordinary welding purposes, torches for soldering automobile radiators and similar work, for plumbers and sheet metal workers, for use in soldering cable boxes and switch boards, for burning off paint, for use by dentists and jewelers, and for other purposes.



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Immediate Delivery

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 80

CHICAGO GEAR WORKS

769-773 W. Jackson Blvd., Chicago, Ill.

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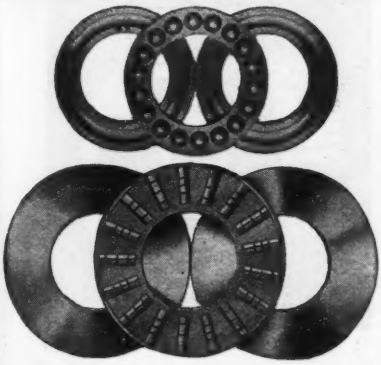

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ROLLER THRUST BEARINGS
JOURNAL ROLLER BEARINGS

Special Bearings, Made to Order.
Send Sketch or Sample for Quotation.

Catalog Upon Request

THE GWILLIAM COMPANY
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Micrometer Gauges

For accurate, dependable, fast, impersonal measuring and testing. Quality construction insures long performance. There's a gauge for every purpose.

Write for booklet illustrating these precision instruments. No obligation.

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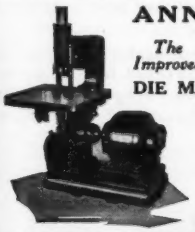
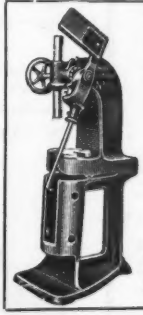
Waltham, Mass.
Detroit Branch:
1024 Michigan Theater Bldg.

ANNOUNCING
The Improved **OLIVER**
DIE MAKING MACHINE
With Many New Features



Send for our new bulletin and learn how to cut die costs 30% to 60%.

OLIVER INSTRUMENT CO.
1430 E. Maumee Street, Adrian, Michigan



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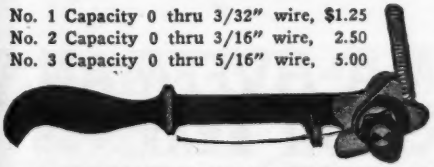
Write for our Catalog showing 64 different styles

EDWIN E. BARTLETT CO.
NASHUA, N. H.

NOW—A REAL SPRING WINDER!

No. 1 Capacity 0 thru 3/32" wire, $1.25
No. 2 Capacity 0 thru 3/16" wire, 2.50
No. 3 Capacity 0 thru 5/16" wire, 5.00

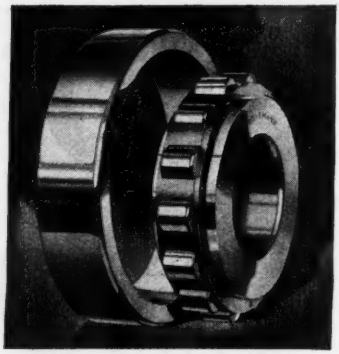


Will Earn Its Cost in One Day

The HJORTH Perfection Spring Winder offers the ideal means of winding extension, compression, torsion, taper, double taper, or left hand springs. Try one in your shop. You'll like it and the price is reasonable.

HJORTH LATHE & TOOL CO. 60 STATE ST. BOSTON, MASS.

WHERE NO OTHER TYPE OF BEARING WILL



STAND UP

Because of Extreme Load Conditions, Use

PRECISION ROLLER BEARINGS

With the Heavy Bronze Cage

Picture to yourself the most difficult load conditions a bearing can be called upon to meet—high speed, heavy load, temporary overloads, shock, vibration. Then read, in the adjoining column, how NORMA-HOFFMANN Precision Roller Bearings—time-tested heavy-duty units—meet these conditions.

• • •

And remember—PRECISION Roller Bearings interchange in size with all standard ball bearings. They can be had—in addition to the standard type here illustrated—in one-lip, two-lip (self-contained), full roller type (without cage), self-aligning and adapter types.

PARALLEL LINE CONTACT

Solid cylindrical rollers between cylindrical races providing maximum load contact area, increased steady load capacity, and a larger shock-absorbing capacity than any other type of single-row bearing.

SAFETY FACTOR

A margin ample for temporary overloads up to 50% beyond normal rating, as under peak loads, in unusually severe duty, or under shock conditions.

SUPERIOR CAGE

Made of extruded bronze to secure maximum density and uniformity—machined all over for balance—riding on inner ring lands or shoulders, relieving the rolling elements of its weight.

EXTREME ACCURACY

Rollers held to .0001 inch on diameter and to .0002 inch on length, throughout—absolutely true rolling surfaces, ends absolutely square with the sides—highly finished, quiet, friction-free.

DURABILITY

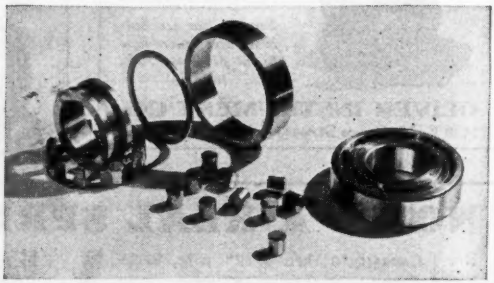
Uniform contact throughout the length of the rollers, providing the most efficient load distribution—greater wear-resisting surfaces—true rolling between all load contact areas—minimum friction between roller and cage.

SPEED QUALITIES

A lower friction coefficient under heavy load than any other type of bearing—a speed ability equal to that of any ball bearing, size for size, up to 35,000 R.P.M.

•

There's no duty too hard for a PRECISION Roller Bearing. And, for the less exacting duties, there are PRECISION Ball and Thrust Bearings. Write for the Catalogs—or ask our engineers for suggestions.



"NORMA-HOFFMANN"

PRECISION BEARINGS

BALL, ROLLER AND THRUST

NORMA-HOFFMANN BEARINGS CORPORATION, STAMFORD, CONN., U. S. A.

At Last!

RESTORED ACCURACY AFTER HARDENING • • •

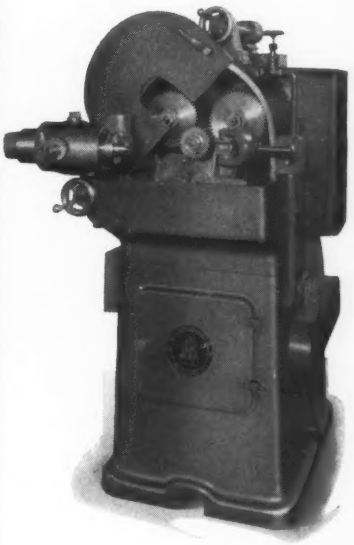
MADE economically possible by Fellows Gear Lapping Methods. The new Fellows Gear Lapping Machine has robbed the hardening fire of its terrors. No longer is it necessary for a gear manufacturer to scrap accurately-cut gears, which in the process of hardening have become distorted so as to impair their original accuracy.

This method of gear tooth finishing affords a measure of control over gear accuracy that heretofore has been lacking, and in addition removes hardening scale, and produces highly-finished contacting tooth profiles, which assure quieter, more efficient, and longer lived gears.

The outstanding advantage of this process is that a superior product is obtained at costs far below any competing method. If you are desirous of reducing your costs, and at the same time improving your product, this new method of finishing gears after hardening is the answer. Write for descriptive circular to:

THE FELLOWS GEAR SHAPER COMPANY

78 River Street, Springfield, Vermont
(616 Fisher Bldg., Detroit, Michigan)

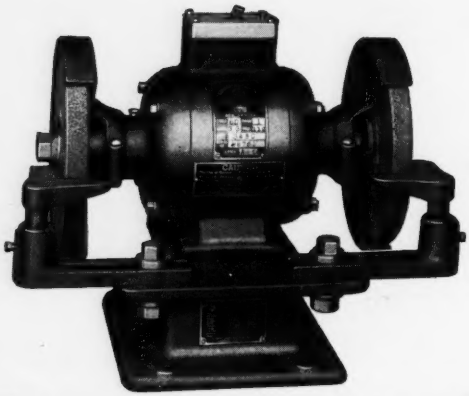


The New Fellows Gear Lapping Machine is adapted to the lapping of Spur, Helical and Herringbone Gears — especially suited to shoulder gears, or gears the teeth of which end in a recess.

FELLOWS
~ GEAR SHAPERS ~

UNMATCHED QUALITY

LOW MAINTENANCE COST.



Thousands of successful mechanics are using U. S. Grinders

A good mechanic always demands good tools!

That's why so many U. S. Grinders are used in plants of every nature —all over the world. By continual tests and comparison, under the most severe conditions, U. S. Grinders have proved to be unmatched for quality and performance. Their maintenance cost is practically nil.

You can now get a U. S. bench grinder for as low as $34.50. Write us (or ask your industrial jobber) for a folder describing the complete line of U. S. grinders.

THE UNITED STATES ELECTRICAL TOOL CO.

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In Canada—Maple Leaf Electric Tools, Ltd.—Toronto.

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